

IQ 250/260

Low-Cost High Performance Multifunction Electricity Meter

User & Installation Manual



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1 Introduction

About This Manual

This document is the user manual for the installation, operation, and maintenance of the Eaton IQ 250/260 Meter. It is intended for authorized and qualified personnel who use the IQ 250/260 Meter. Please refer to the specific WARNINGS and CAUTIONS in this section before proceeding. For Technical Support and after hour emergencies, contact our Power Quality Technical Support team at 1-800-809-2772, option 4 / sub-option 1 or by email at PQSUPPORT@EATON.COM. For those outside the United States and Canada, call 414-449-7100 option 4 / sub-option 1. You can also visit us on the web at <http://www.eaton.com> and follow the Products link.

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Safety Precautions

All safety codes, safety standards, and/or regulations must be strictly observed in the installation, operation, and maintenance of this device.

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WARNINGS refer to instructions that, if not followed, can result in death or injury.



CAUTIONS refer to instructions that, if not followed, can result in equipment damage.



WARNINGS

SHOCK HAZARDS:

IMPROPER INSTALLATION CAN CAUSE DEATH, INJURY, AND/OR EQUIPMENT DAMAGE.

Follow all Warnings and Cautions. Completely read and understood the information in this document before attempting to install or operate the equipment. Improper wiring could cause death, injury, or equipment damage. Only qualified personnel are to service the IQ 250/260 Meter.

TROUBLESHOOTING PROCEDURES MAY REQUIRE PROXIMITY TO EXPOSED ENERGIZED (LIVE) ELECTRICAL WIRING AND/OR PARTS WHERE THE HAZARD OF FATAL ELECTRIC SHOCK IS PRESENT. Exercise extreme care to avoid injury or death. Always disconnect, lock-out, and tag the current and voltage sources and the control power supply circuit before touching the connections or components on the rear face of the meter base unit.

FAILURE TO GROUND THE IQ 250/260 METER MAY RESULT IN INJURY, DEATH, OR EQUIPMENT DAMAGE. Properly ground the IQ 250/260 Meter during installation.

Covered by one or more of the following patents:

US Patent Numbers D526920, D525893, 6751563, 6735535, 6636030.

2 Overview and Specifications

IQ 250/260 Overview

The IQ 250/260 is a multifunction power and energy meter designed to be used in electrical substations, panel boards, and as a primary revenue meter, due to its high performance measurement capability. The unit provides multifunction measurement of all electrical parameters and makes the data available in multiple formats via display, communication systems, and through analog signal transmission.



Figure 2.1: IQ 250/260 Meter

The IQ 250/260 meter is designed with advanced measurement capabilities, allowing it to achieve high performance accuracy. It is specified as a 0.2% class energy meter for billing applications as well as a highly accurate panel indication meter.

The IQ 250/260 provides additional capabilities, including standard RS485, Modbus and DNP 3.0 Protocols, and Option cards that can be added at any time.

Features of the IQ 250/260 include:

- 0.2% Class revenue certifiable energy and demand metering
- Meets ANSI C12.20 (0.2%) and IEC 687 (0.2%) classes
- Multifunction measurement including voltage, current, power, frequency, energy, power factor, etc.
- Power quality measurements (%THD and Alarm Limits) IQ 260 only
- Percentage of Load Bar for analog meter reading
- Easy to use faceplate programming
- RS485 communication
- Optional I/O Cards - field upgradeable without removing installed meter

In addition to the IQ 250/260M - meter with integral display/transducer configuration, an IQ 250/260T transducer configuration is available. The IQ 250/260T is a digital transducer only unit (without a display), providing RS485 communication via Modbus RTU, Modbus ASCII or DNP 3.0 protocols.

The IQ 250/260T is designed to install using DIN Rail Mounting. (See Chapter 3 of this manual for IQ 250/260T mounting information.)



Figure 2.2: IQ 250/260T

Voltage and Current Inputs

Universal Voltage Inputs

Voltage Inputs allow measurement up to 576VAC (Phase to Reference) and 721VAC (Phase to Phase). This insures proper meter safety when wiring directly to high voltage systems. One unit will perform to specification on 69 Volt, 120 Volt, 230 Volt, 277 Volt, and 347 Volt power systems.

NOTE: Higher voltages require the use of potential transformers (PTs).

Current Inputs

The unit supports a 5 amp or a 1 amp secondary for current measurements.

NOTE: The secondary current must be specified and ordered with the meter.

The IQ 250/260 Current Inputs use a unique dual input method:

Method 1: CT Pass Through

The CT passes directly through the meter without any physical termination on the meter. This insures that the meter cannot be a point of failure on the CT circuit. This is preferable for utility users when sharing relay class CTs. No Burden is added to the secondary CT circuit.

Method 2: Current “Gills”

This unit additionally provides ultra-rugged Termination Pass Through Bars that allow CT leads to be terminated on the meter. This, too, eliminates any possible point of failure at the meter. This is a preferred technique for insuring that relay class CT integrity is not compromised (the CT will not open in a fault condition).

Ordering Information

IQ - 260 - M - A - 6 - 5 - 1 - 1 - 0

1	2	3	4	5	6	7

1. Model:

250 = Power Meter

260 = Power Quality Meter

2. Meter Type

M = Meter (with integral display)

T = Transducer Only (no display)

3. Frequency:

5 = 50 Hz System

6 = 60 Hz System

4. Current Input:

5 = 5 Amp Secondary

1 = 1 Amp Secondary

5. Power Supply:

1 = Universal, (90 - 265) VAC @50/60Hz or (100-370) VDC

4 = (18 - 60) VDC

6. I/O Slot 1: (See Chapter 7 for I/O Card Specifications.)

0 = None

1 = 2 Relay Outputs/2 Status Inputs

2 = 4 KYZ Pulses/4 Status Inputs

3 = 4 Analog Outputs - 0-1 mA

4 = 4 Analog Outputs - 4-20 mA

7. I/O 2: (See Chapter 7 for I/O Card Specifications.)

0 = None

1 = 2 Relay Outputs/2 Status Inputs

2 = 4 KYZ Pulses/4 Status Inputs

3 = 4 Analog Outputs - 0-1 mA

4 = 4 Analog Outputs - 4-20 mA

Example: IQ 260-M-A-6-5-1-1-0

(IQ 260 Power Quality Meter with 60 Hz System, 5 Amp Secondary, 90-265 VAC/100-370 VDC Power Supply, 2 Relay Outputs/2 Status Inputs I/O Card in Card Slot 1 and no card in Card Slot 2)

Measured Values

The IQ 250/260 provides the following Measured Values all in Real-Time Instantaneous, and some additionally as Average, Maximum and Minimum values.

IQ 250/260 Measured Values

Measured Values	Instantaneous	Avg	Max	Min
Voltage L-N	X		X	X
Voltage L-L	X		X	X
Current per Phase	X	X	X	X
Current Neutral	X	X	X	X
WATT(A,B,C,Tot.)	X	X	X	X
VAR (A,B,C,Tot.)	X	X	X	X
VA (A,B,C,Tot.)	X	X	X	X
PF (A,B,C,Tot.)	X	X	X	X
+Watt-Hour (A,B,C,Tot.)	X			
-Watt-Hour (A,B,C,Tot.)	X			
Watt-Hour Net	X			
+VAR-Hour (A,B,C,Tot.)	X			
-VAR-Hour (A,B,C,Tot.)	X			
VAR-Hour Net (A,B,C,Tot.)	X			
VA-Hour (A,B,C,Tot.)	X			
Frequency	X		X	X
%THD (IQ 260)	X		X	X
Voltage Angles	X			
Current Angles	X			
% of Load Bar	X			

Utility Peak Demand

The IQ 250/260 provides user-configured Fixed Window or Sliding Window Demand modes. This feature enables you to set up a customized Demand profile. Fixed Window Demand mode records the average demand for time intervals that you define (usually 5, 15 or 30 minutes). Sliding Window Demand mode functions like multiple, overlapping Fixed Window Demands. You define the subintervals at which an average of demand is calculated. An example of Sliding Window Demand mode would be a 15-minute Demand block using 5-minute subintervals, thus providing a new demand reading every 5 minutes, based on the last 15 minutes.

Utility Demand Features can be used to calculate Watt, VAR, VA and PF readings. Voltage provides an Instantaneous Max and Min reading which displays the highest surge and lowest sag seen by the meter. All other parameters offer Max and Min capability over the selectable averaging period.

Specifications**Power Supply**

Range:	1 Option: Universal, (90 - 265)VAC @50/60 Hz or (100-370)VDC 4 Option: (18 - 60)VDC
Power Consumption:	(5 to 10)VA, (3.5 to 7)W - depending on the meter's hardware configuration

Voltage Inputs (Measurement Category III) (See Accuracy Specifications, later in this chapter.)

Range:	Universal, Auto-ranging: Phase to Reference (Va, Vb, Vc to Vref): (20 to 576)VAC Phase to Phase (Va to Vb, Vb to Vc, Vc to Va): (0 to 721)VAC
Supported hookups:	3 Element Wye, 2.5 Element Wye, 2 Element Delta, 4 Wire Delta
Input Impedance:	1M Ohm/Phase
Burden:	0.36VA/Phase Max at 600 Volts; 0.014VA at 120 Volts
Pickup Voltage:	20VAC
Connection:	7 Pin 0.400" Pluggable Terminal Block AWG#12 -26/ (0.129 -3.31) mm ²
Fault Withstand:	Meets IEEE C37.90.1
Reading:	Programmable Full Scale to any PT Ratio

Current Inputs(See Accuracy Specifications, later in this chapter.)

Class 10:	5A Nominal, 10A Maximum
Class 2:	1A Nominal, 2A Maximum
Burden:	0.005VA Per Phase Max at 11 Amps
Pickup Current:	0.1% of nominal
Connections:	O Lug or U Lug Electrical Connection (Diagram 4.1) Pass-through Wire, 0.177" / 4.5mm Maximum Diameter (Diagram 4.2) Quick Connect, 0.25" Male Tab (Diagram 4.3)
Fault Withstand:	100A/10sec., 300A/3sec., 500A/1sec.
Reading:	Programmable Full Scale to any CT Ratio
Continuous Current Withstand:	20 Amps for Screw Terminated or Pass Through Connections

KYZ/RS485 Port Specifications

RS485 Transceiver; meets or exceeds EIA/TIA-485 Standard:

Type: Two-wire, half duplex
Min. Input Impedance: 96kΩ
Max. Output Current: ±60mA

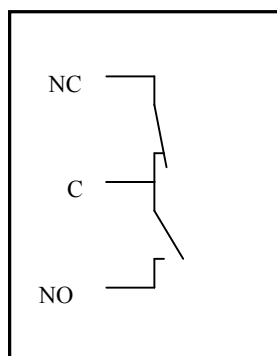
Wh Pulse

KYZ output contacts (and infrared LED light pulses through face plate):
(See Chapter 6 for Kh values.)

Pulse Width: 90ms
Full Scale Frequency: ~3Hz
Contact type: Solid State – SPDT (NO – C – NC)
Relay type: Solid state
Peak switching voltage: DC ±350V
Continuous load current: 120mA
Peak load current: 350mA for 10ms
On resistance, max.: 35Ω
Leakage current: 1μA@350V
Isolation: AC 3750V
Reset State: (NC - C) Closed; (NO - C) Open

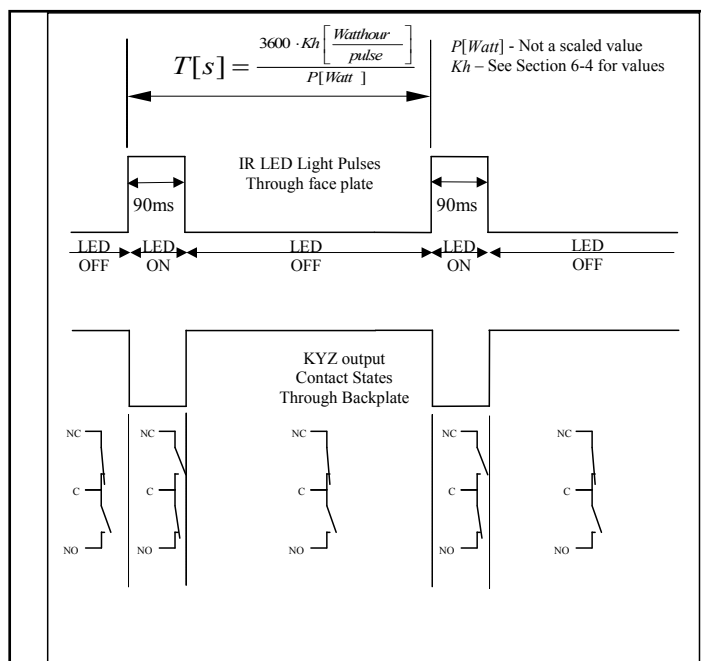
Infrared LED:
Peak Spectral Wavelength: 940nm
Reset State: Off

Internal Schematic:



(De-energized State)

Output timing:



Isolation

All Inputs and Outputs are galvanically isolated to 2500 Vac

Environmental Rating

Storage:	(-20 to +70) ⁰ C
Operating:	(-20 to +70) ⁰ C
Humidity:	to 95% RH Non-condensing
Faceplate Rating:	NEMA12 (Water Resistant), Mounting Gasket Included

Measurement Methods

Voltage, Current:	True RMS
Power:	Sampling at over 400 Samples per Cycle on All Channels

Update Rate

Watts, VAR and VA:	Every 6 cycles (e.g., 100 ms @ 60 Hz)
All other parameters:	Every 60 cycles (e.g., 1 s @ 60 Hz)
	1 second for current only measurement, if reference voltage is not available

Communication

Standard:

1. RS485 Port through Back Plate
2. Energy Pulse Output through Back Plate

Protocols:	Modbus RTU, Modbus ASCII, DNP 3.0
Com Port Baud Rate:	9,600 to 57,600 bps
Com Port Address:	001-247
Data Format:	8 Bit, No Parity
IQ 250/260T	Default Initial Communication Baud 9600 (See Chapter 5)

Mechanical Parameters

Dimensions: see Chapter 3.

Weight: 2 pounds/ 0.9kg (ships in a 6"/152.4mm cube container)
(Without Option Card)

Compliance

- UL Listing: USL/CNL E250818
- IEC 687 (0.2% Accuracy)
- ANSI C12.20 (0.2% Accuracy)
- ANSI C62.41 (Burst)
- IEC 1000-4-2 - ESD

Accuracy (See full Range specifications earlier in this chapter.)

For 23° C, 3 Phase balanced Wye or Delta load, at 50 or 60 Hz (as per order), 5A (Class 10) nominal unit:

Parameter	Accuracy	Accuracy Input Range ¹
Voltage L-N [V]	0.1% of reading	(69 to 480)V
Voltage L-L [V]	0.2% of reading ²	(120 to 600)V
Current Phase [A]	0.1% of reading ³	(0.15 to 5) A
Current Neutral (calculated) [A]	2% of Full Scale	(0.15 to 5) A @ (45 to 65) Hz
Active Power Total [W]	0.2% of reading ^{1, 2}	(0.15 to 5) A @ (69 to 480) V @ +/- (0.5 to 1) lag/lead PF
Active Energy Total [Wh]	0.2% of reading ^{1, 2}	(0.15 to 5) A @ (69 to 480) V @ +/- (0.5 to 1) lag/lead PF
Reactive Power Total [VAR]	0.2% of reading ^{1, 2}	(0.15 to 5) A @ (69 to 480) V @ +/- (0 to 0.8) lag/lead PF
Reactive Energy Total [VARh]	0.2% of reading ^{1, 2}	(0.15 to 5) A @ (69 to 480) V @ +/- (0 to 0.8) lag/lead PF
Apparent Power Total [VA]	0.2% of reading ^{1, 2}	(0.15 to 5) A @ (69 to 480) V @ +/- (0.5 to 1) lag/lead PF
Apparent Energy Total [VAh]	0.2% of reading ^{1, 2}	(0.15 to 5) A @ (69 to 480) V @ +/- (0.5 to 1) lag/lead PF
Power Factor	0.2% of reading ^{1, 2}	(0.15 to 5) A @ (69 to 480) V @ +/- (0.5 to 1) lag/lead PF
Frequency [Hz]	+/- 0.03 Hz	(45 to 65) Hz
Total Harmonic Distortion [%]	+/- 2%	(0.5 to 10)A ⁴ or (69 to 480)V, measurement range (1 to 99.99)%
Load Bar	+/- 1 segment	(0.005 to 6) A

- ¹ For 2.5 element programmed units, degrade accuracy by an additional 0.5% of reading.
 - For 1A (Class 2) Nominal, degrade accuracy by an additional 0.5% of reading.
 - For 1A (Class 2) Nominal, the input current range for accuracy specification is 20% of the values listed in the table.
- ² For unbalanced voltage inputs where at least one crosses the 150V autoscale threshold (for example, 120V/120V/208V system), degrade the accuracy to 0.4% of reading.
- ³ With reference voltage applied (VA, VB, or VC). Otherwise, degrade accuracy to 0.2%. See hookup diagrams 8, 9, and 10 in Chapter 4.
- ⁴ At least one voltage input (minimum 20 Vac) must be connected for THD measurement on current channels.

3 Mechanical Installation

Introduction

The IQ 250/260 meter can be installed using a standard ANSI C39.1 (4" Round) or an IEC 92mm DIN (Square) form. In new installations, simply use existing DIN or ANSI punches. For existing panels, pull out old analog meters and replace them with the IQ 250/260. The various models use the same installation. See Chapter 4 for wiring diagrams.

NOTE: The drawings shown below and on the next page give you the meter dimensions in inches and millimeters (mm shown in brackets). Tolerance is ± 0.1 " [2.54 mm].

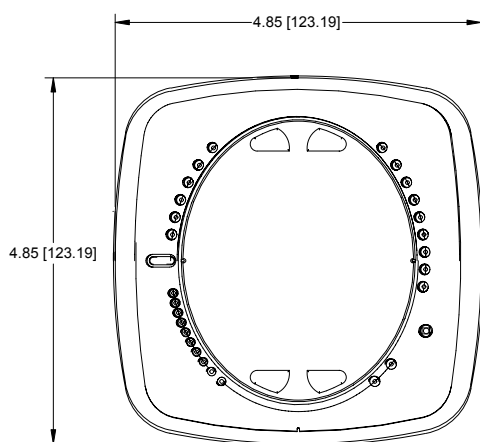


Figure 3.1: IQ 250/260 Face

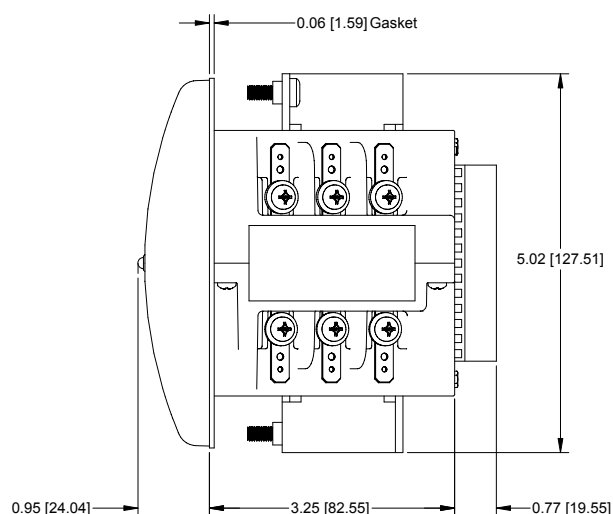


Figure 3.2: IQ 250/260 Dimensions

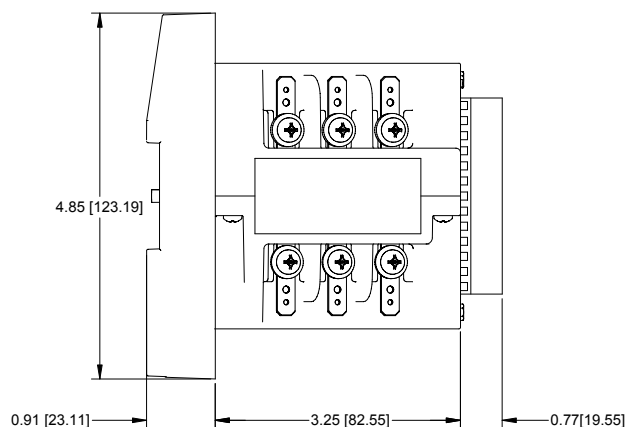


Figure 3.3: IQ 250/260T Dimensions

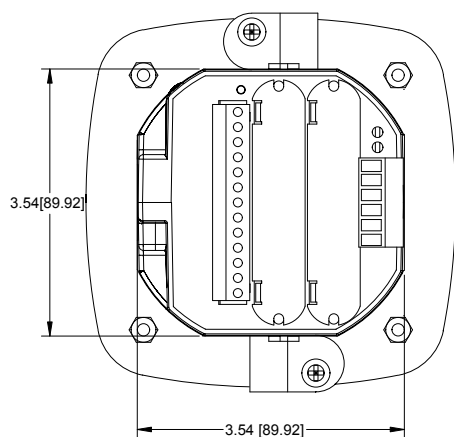


Fig. 3.4: IQ 250/260 Back Face

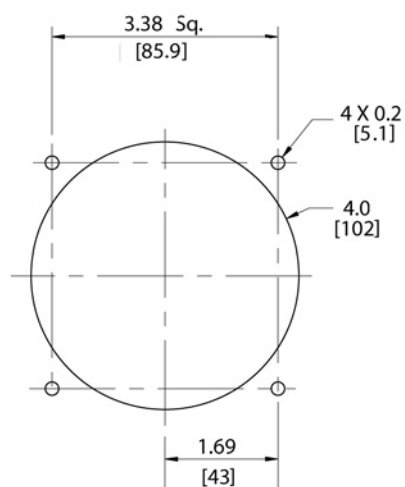


Figure 3.5: ANSI Mounting Panel Cutout

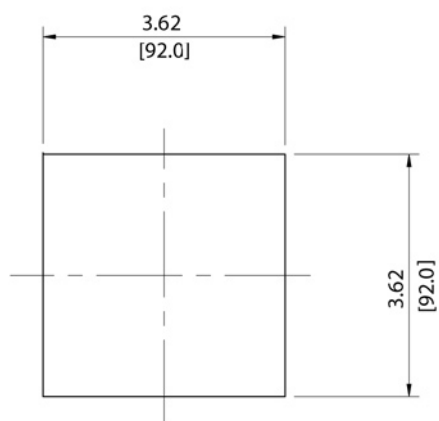


Figure 3.6: DIN Mounting Cutout

ANSI Installation Steps

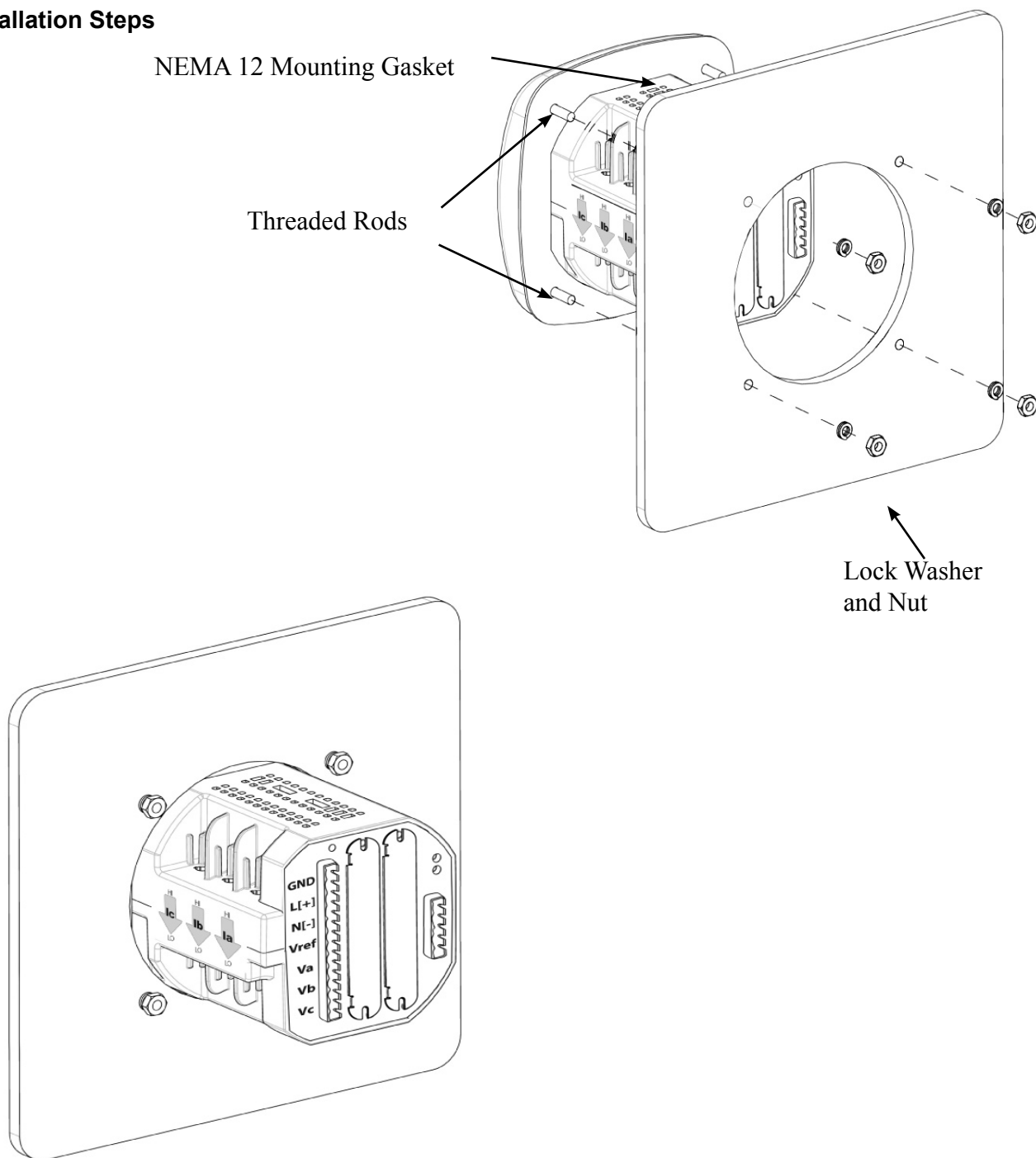


Figure 3.7: ANSI Mounting Procedure

1. Insert 4 threaded rods by hand into the back of meter. Twist until secure.
2. Slide NEMA 12 Mounting Gasket onto back of meter with rods in place.
3. Slide meter with Mounting Gasket into panel.
4. Secure from back of panel with lock washer and nut on each threaded rod. Use a small wrench to tighten. Do not overtighten.

DIN Installation Steps

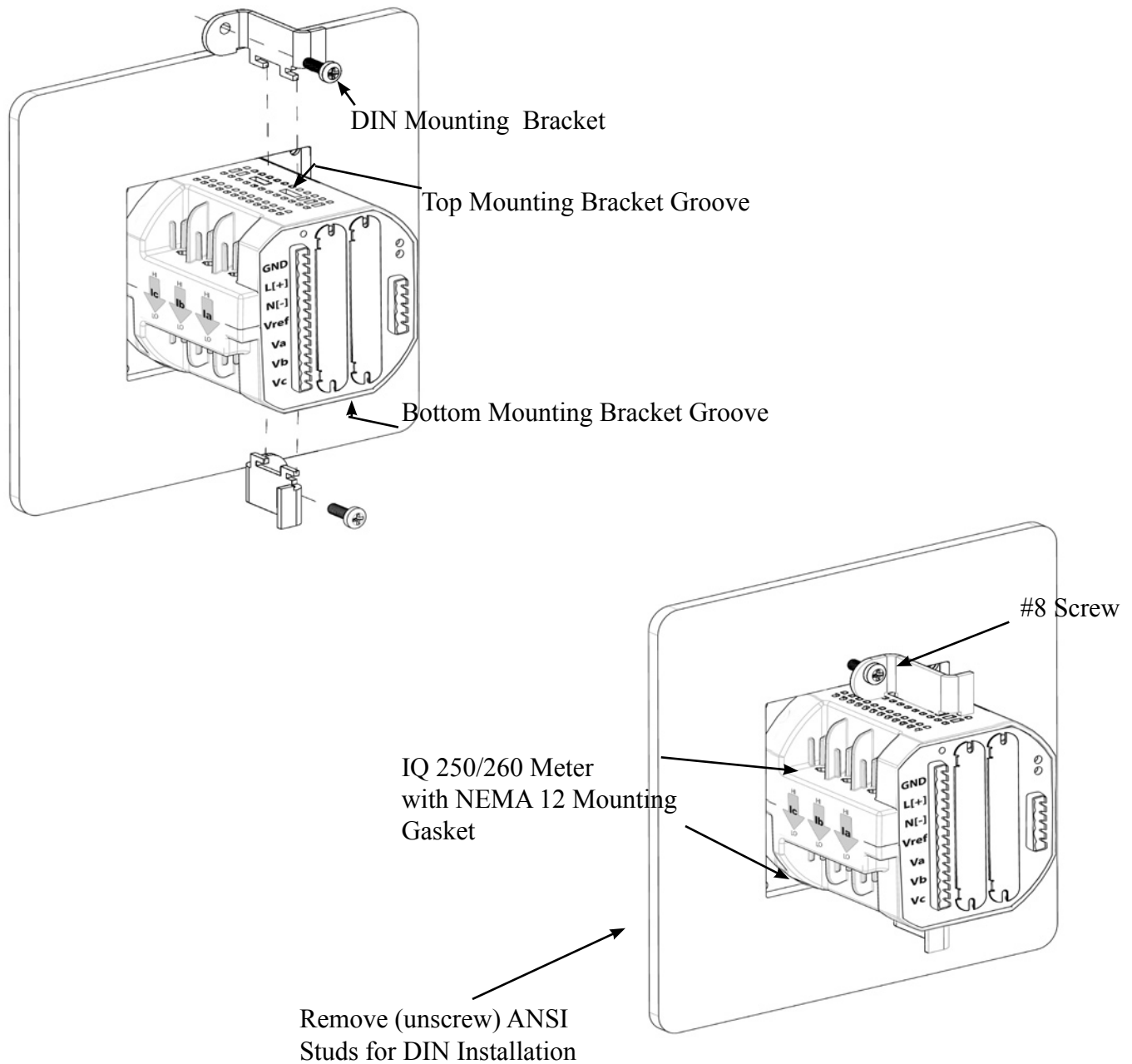


Figure 3.8: DIN Mounting Procedure

1. Slide meter with NEMA 12 Mounting Gasket into panel. (Remove ANSI Studs, if in place.)
2. From back of panel, slide 2 DIN Mounting Brackets into grooves in top and bottom of meter housing. Snap into place.
3. Secure meter to panel with lock washer and a #8 screw through each of the 2 mounting brackets. Tighten with a #2 Phillips screwdriver. Do not overtighten.

IQ 250/260T Transducer Installation

The IQ 250/260T Transducer model is installed using DIN Rail Mounting.

Specs for DIN Rail Mounting:	International Standards DIN 46277/3
DIN Rail (Slotted) Dimensions:	0.297244" x 1.377953" x 3" (inches)
	7.55mm x 35mm x 76.2mm (millimeters)

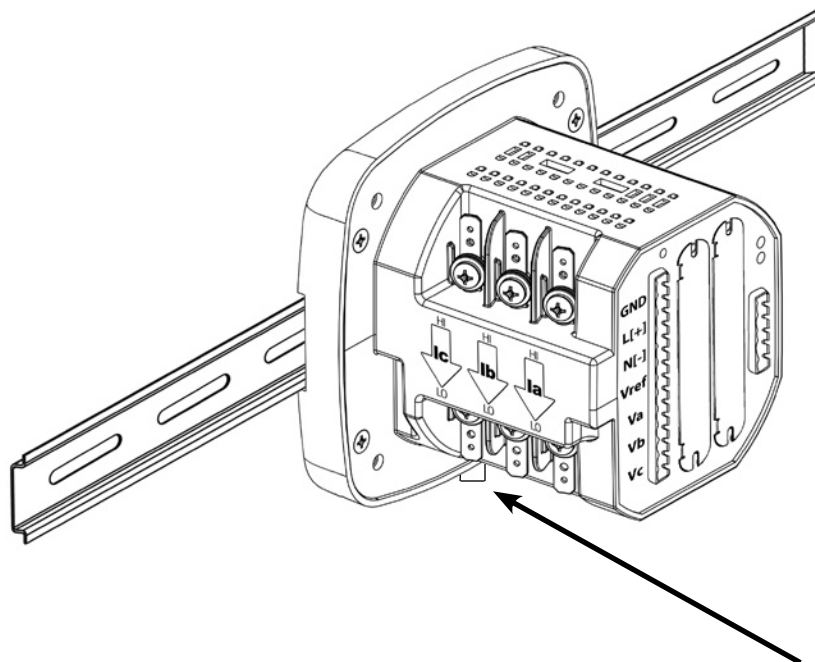


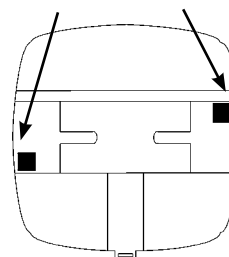
Figure 3.9: DIN Rail Mounting Procedure

Release Clip

1. Slide top groove of meter onto the DIN Rail.
2. Press gently until the meter clicks into place.

NOTES:

- To remove the meter from the DIN Rail, pull down on the Release Clip to detach the unit from the rail.
- If mounting with the DIN Rail provided, use the Black Rubber Stoppers (also provided). See figure on the right.



NOTE ON DIN RAILS:

DIN Rails are commonly used as a mounting channel for most terminal blocks, control devices, circuit protection devices and PLCs. DIN Rails are made of cold rolled steel electrolytically plated and are also available in aluminum, PVC, stainless steel and copper.

4 Electrical Installation

Considerations When Installing Meters

Installation of the IQ 250/260 Meter must be performed **only by** qualified personnel who follow standard safety precautions during all procedures. Those personnel should have appropriate training and experience with high voltage devices. Appropriate safety gloves, safety glasses and protective clothing is recommended.



During normal operation of the IQ 250/260 Meter, dangerous voltages flow through many parts of the meter, including: Terminals and any connected CTs (Current Transformers) and PTs (Potential Transformers), all I/O Modules (Inputs and Outputs) and their circuits. All Primary and Secondary circuits can, at times, produce lethal voltages and currents. Avoid contact with any current-carrying surfaces.

Do not use the meter or any I/O Output Device for primary protection or in an energy-limiting capacity. The meter can only be used as secondary protection. Do not use the meter for applications where failure of the meter may cause harm or death. Do not use the meter for any application where there may be a risk of fire.

All meter terminals should be inaccessible after installation.

Do not apply more than the maximum voltage the meter or any attached device can withstand. Refer to meter and/or device labels and to the Specifications for all devices before applying voltages. Do not HIPOT/Dielectric test any Outputs, Inputs or Communications terminals.

Eaton recommends the use of Shorting Blocks and Fuses for voltage leads and power supply to prevent hazardous voltage conditions or damage to CTs, if the meter needs to be removed from service. CT grounding is optional.

NOTES:



- IF THE EQUIPMENT IS USED IN A MANNER NOT SPECIFIED BY THE MANUFACTURER, THE PROTECTION PROVIDED BY THE EQUIPMENT MAY BE IMPAIRED.
- THERE IS NO REQUIRED PREVENTIVE MAINTENANCE OR INSPECTION NECESSARY FOR SAFETY. HOWEVER, ANY REPAIR OR MAINTENANCE SHOULD BE PERFORMED BY THE FACTORY.



DISCONNECT DEVICE: The following part is considered the equipment disconnect device. A SWITCH OR CIRCUIT-BREAKER SHALL BE INCLUDED IN THE END-USE EQUIPMENT OR BUILDING INSTALLATION. THE SWITCH SHALL BE IN CLOSE PROXIMITY TO THE EQUIPMENT AND WITHIN EASY REACH OF THE OPERATOR. THE SWITCH SHALL BE MARKED AS THE DISCONNECTING DEVICE FOR THE EQUIPMENT.

CT Leads Terminated to Meter

The IQ 250/260 is designed to have Current Inputs wired in one of three ways. Diagram 4.1 shows the most typical connection where CT Leads are terminated to the meter at the Current Gills. This connection uses Nickel-Plated Brass Studs (Current Gills) with screws at each end. This connection allows the CT wires to be terminated using either an “O” or a “U” lug. Tighten the screws with a #2 Phillips screwdriver.

Other current connections are shown in Figures 4.2 and 4.3. Voltage and RS485/KYZ Connection is shown in Figure 4.4

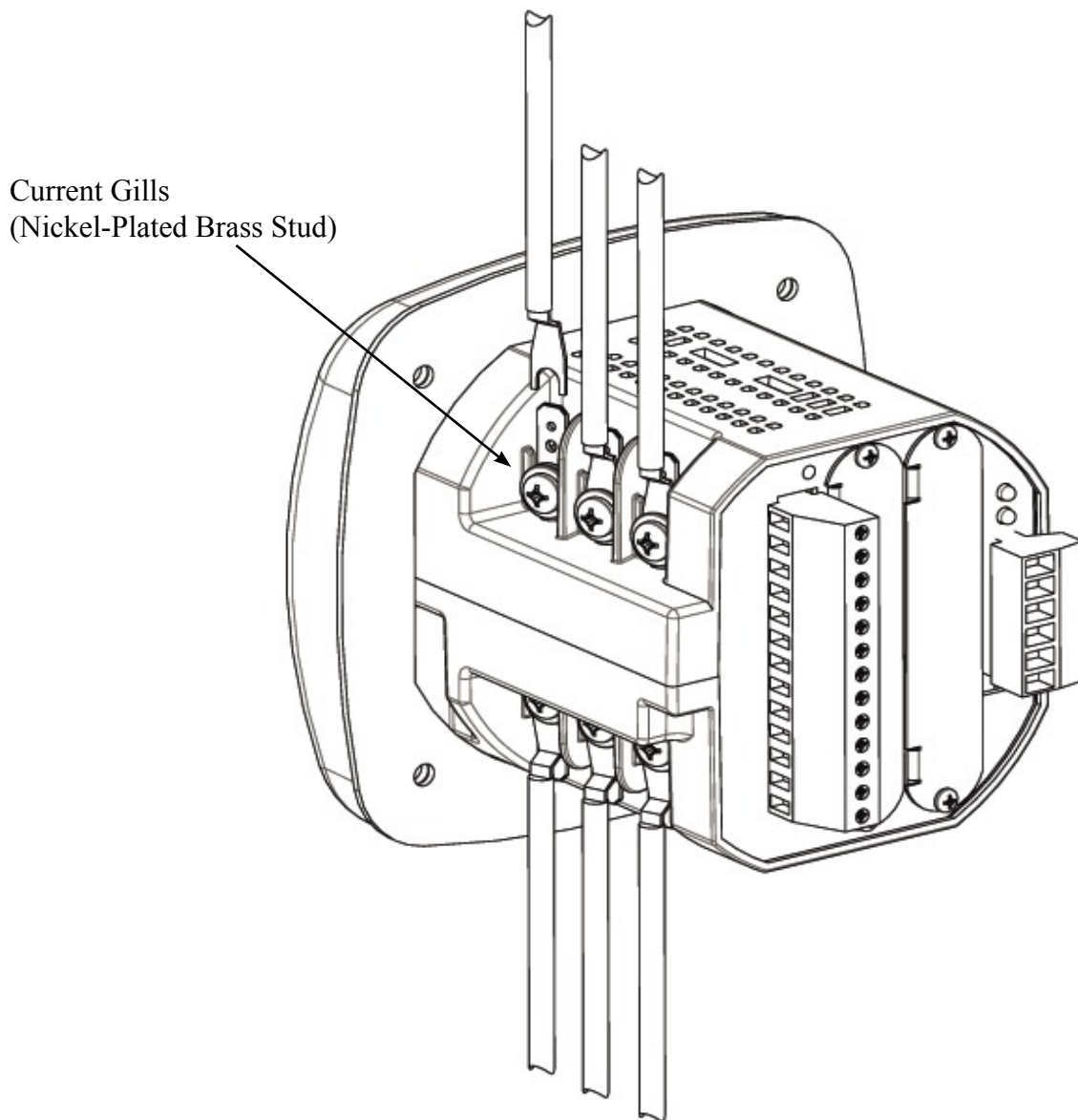


Figure 4.1: CT Leads terminated to Meter, #8 Screw for Lug Connection

Wiring Diagrams are shown later in this chapter.

Communications Connections are detailed in Chapter 5.

CT Leads Pass Through (No Meter Termination)

The second method allows the CT wires to pass through the CT Inputs without terminating at the meter. In this case, remove the Current Gills and place the CT wire directly through the CT opening. The opening will accommodate up to 0.177" / 4.5mm maximum diameter CT wire.

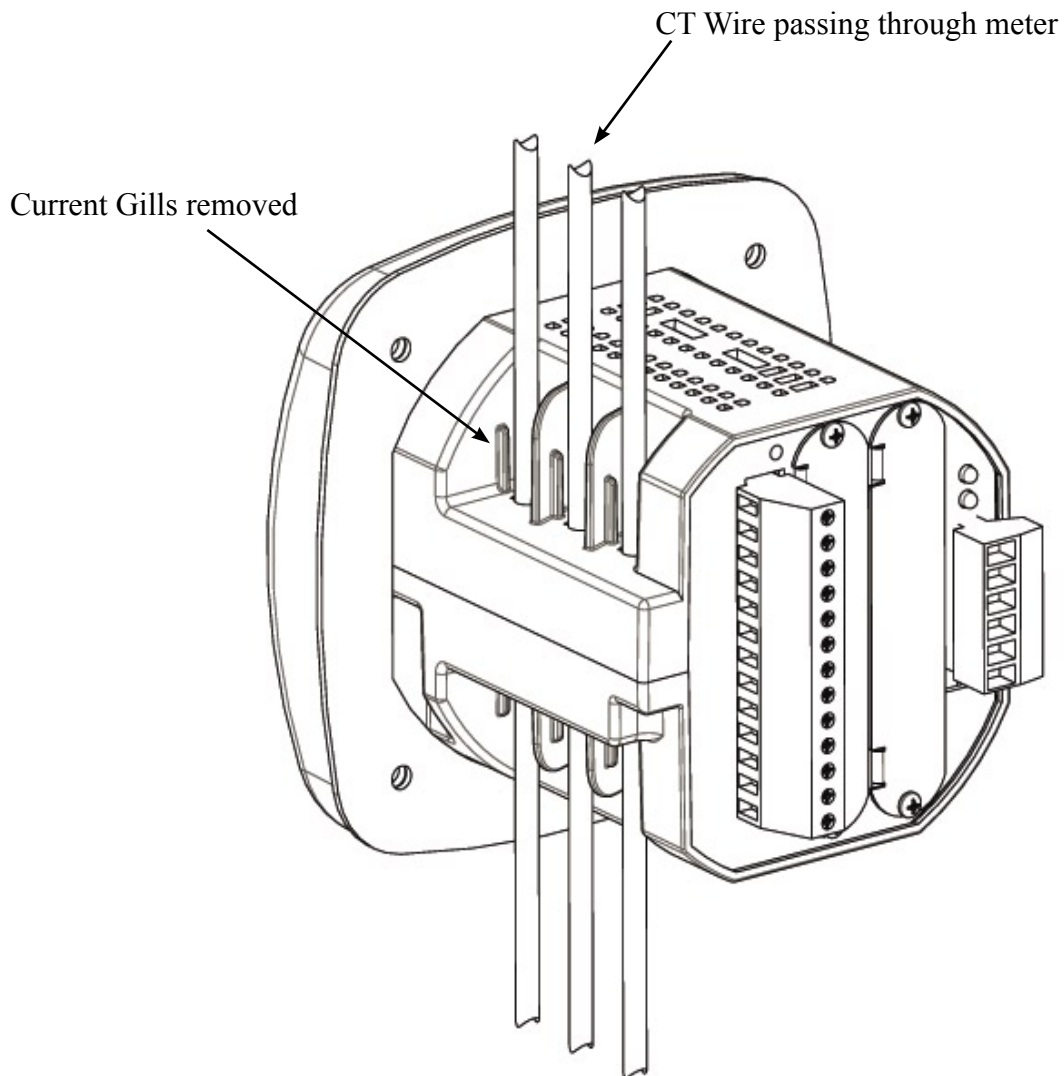


Figure 4.2: Pass-Through Wire Electrical Connection

Quick Connect Crimp-on Terminations

For Quick Termination or for Portable Applications, a 0.25" Quick Connect Crimp-on Connectors can also be used.

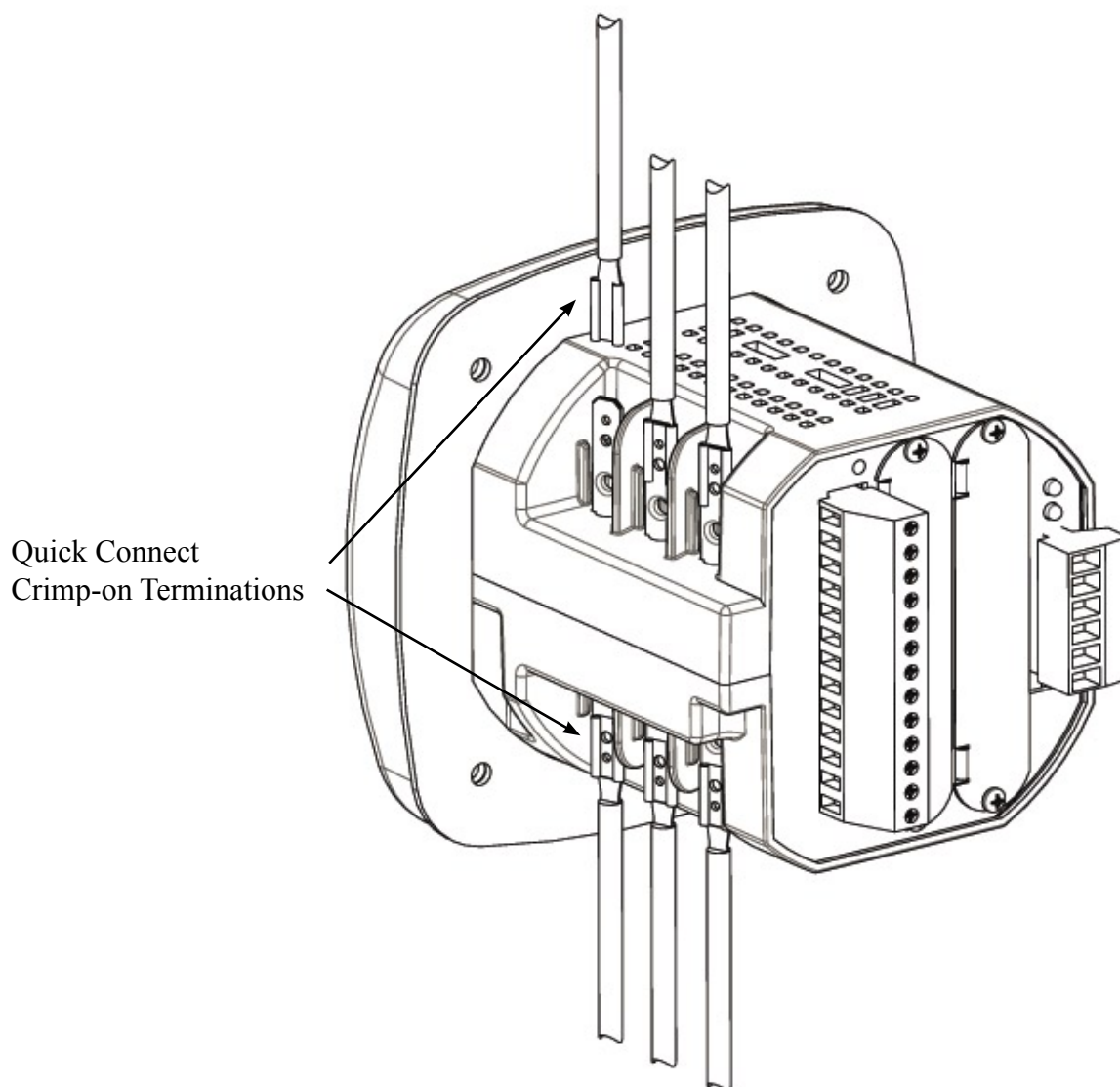


Figure 4.3: Quick Connect Electrical Connection

Voltage and Power Supply Connections

Voltage Inputs are connected to the back of the unit via a optional wire connectors. The connectors accomodate AWG# 12 -26/ (0.129 - 3.31)mm².

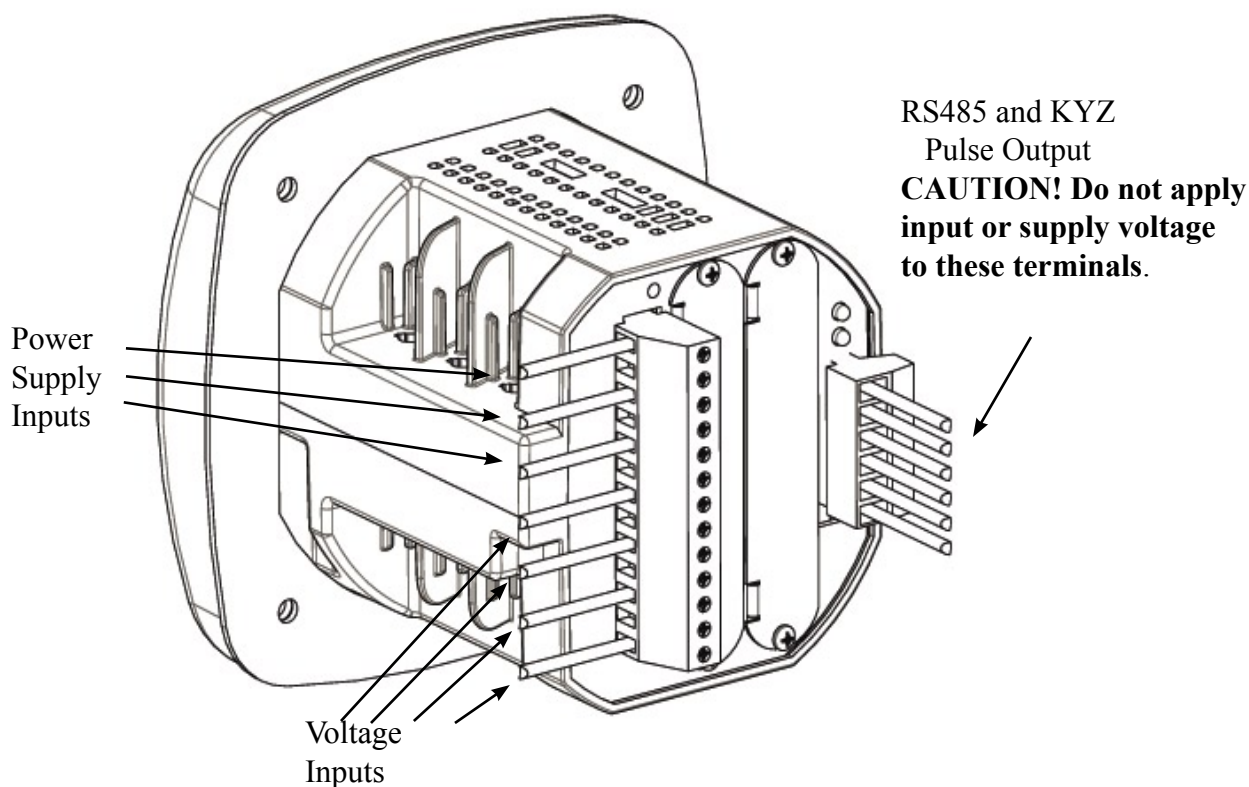


Figure 4.4: Voltage Connection

Ground Connections

The meter's Ground Terminals should be connected directly to the installation's protective earth ground. Use AWG# 12/2.5 mm² wire for this connection.

Voltage Fuses

Eaton recommends the use of fuses on each of the sense voltages and on the control power, even though the wiring diagrams in this chapter do not show them.

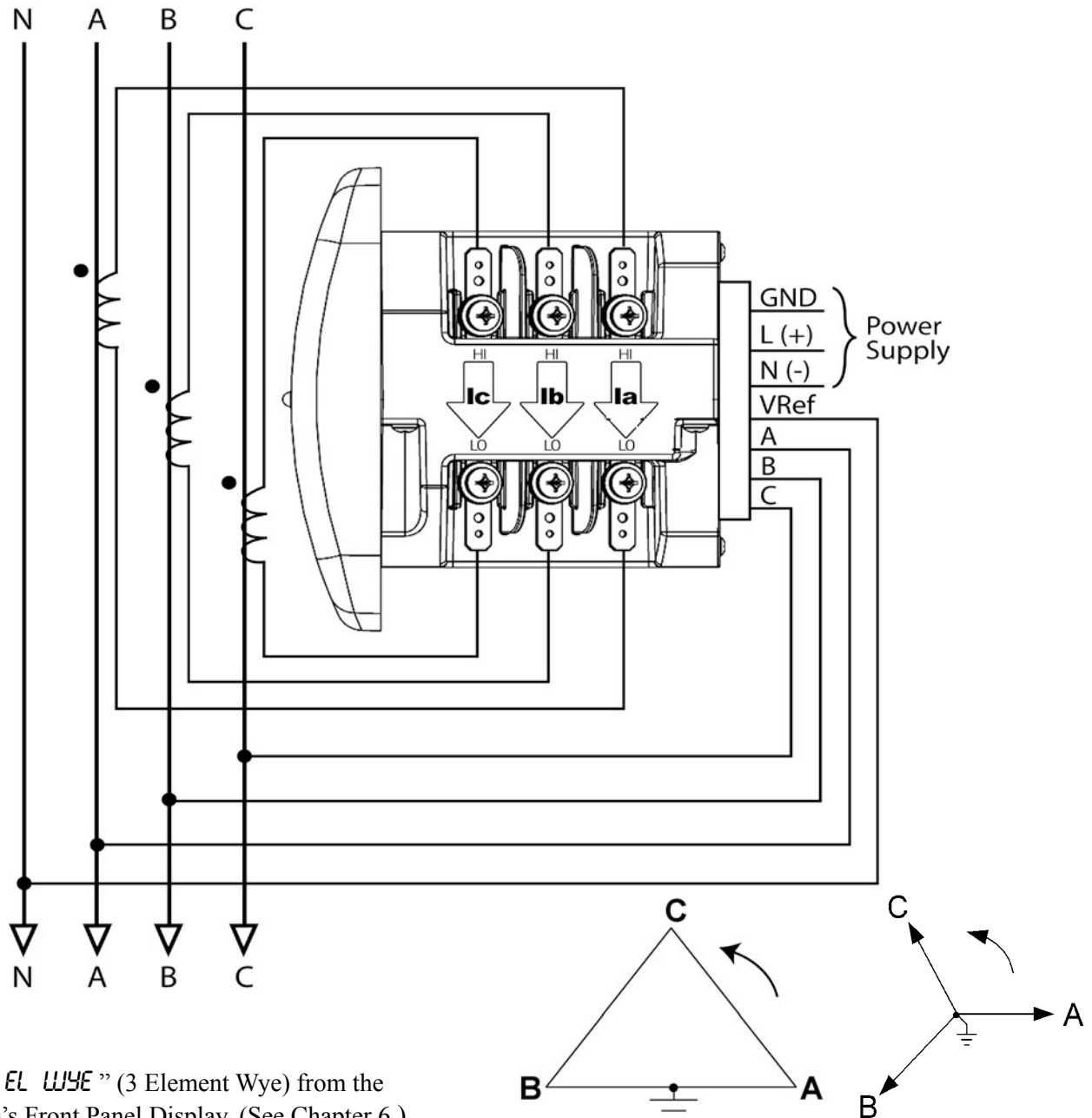
Use a 0.1 Amp fuse on each voltage input.
Use a 3 Amp Slow Blow fuse on the power supply.

Electrical Connection Diagrams

Choose the diagram that best suits your application. Be sure to maintain the CT polarity when wiring.

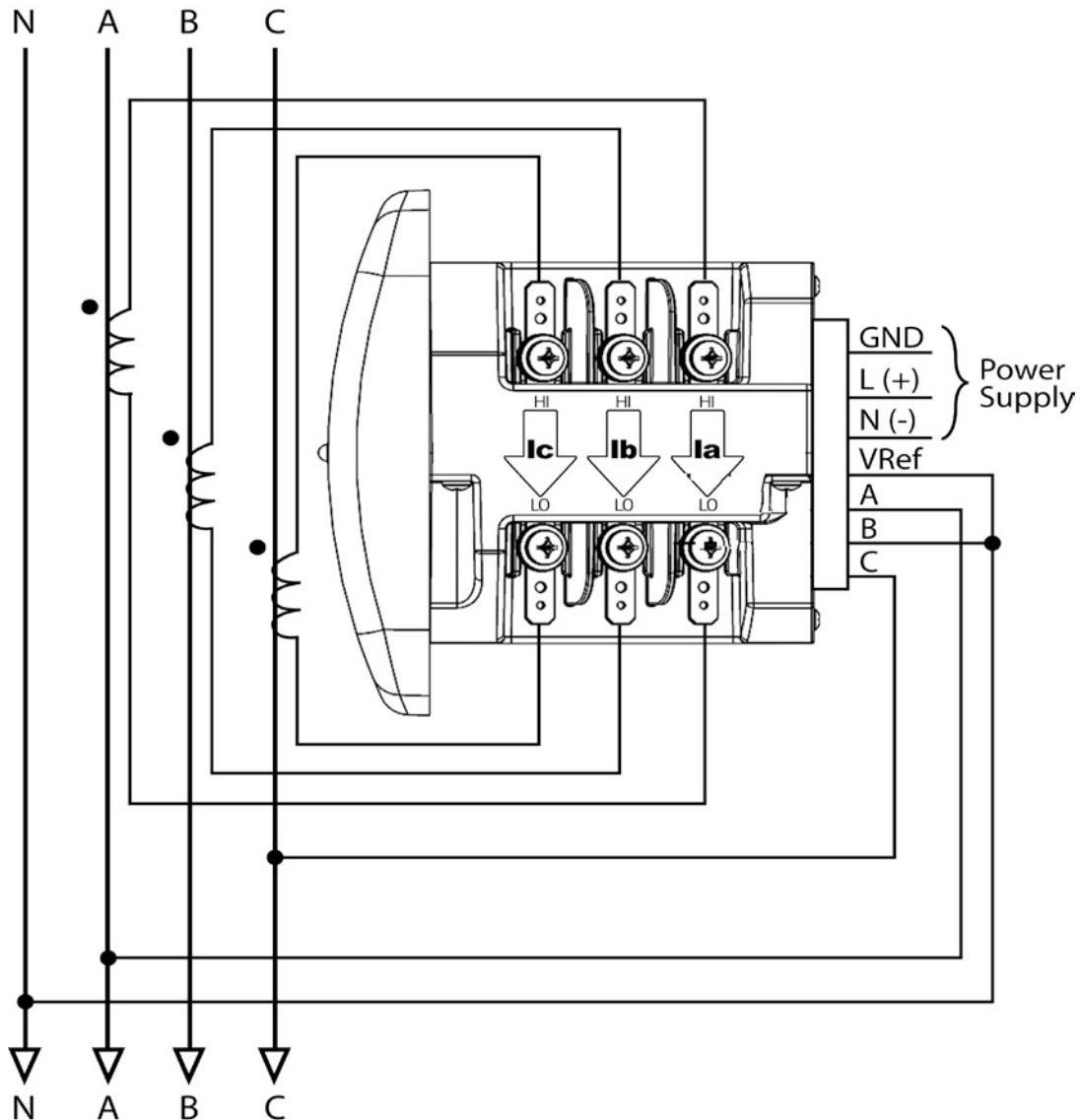
1. Three Phase, Four-Wire System Wye/Delta with Direct Voltage, 3 Element
2. Three Phase, Four-Wire System Wye with Direct Voltage, 2.5 Element
3. Three-Phase, Four-Wire Wye/Delta with PTs, 3 Element
4. Three-Phase, Four-Wire Wye with PTs, 2.5 Element
5. Three-Phase, Three-Wire Delta with Direct Voltage
6. Three-Phase, Three-Wire Delta with 2 PTs
7. Three-Phase, Three-Wire Delta with 3 PTs
8. Current Only Measurement (Three Phase)
9. Current Only Measurement (Dual Phase)
10. Current Only Measurement (Single Phase)

1. Service: WYE/Delta, 4-Wire with No PTs, 3 CTs

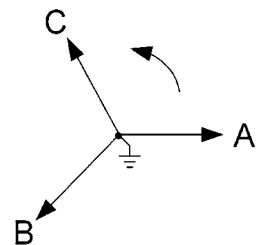


Select: “*3 EL WYE*” (3 Element Wye) from the IQ 250/260’s Front Panel Display. (See Chapter 6.)

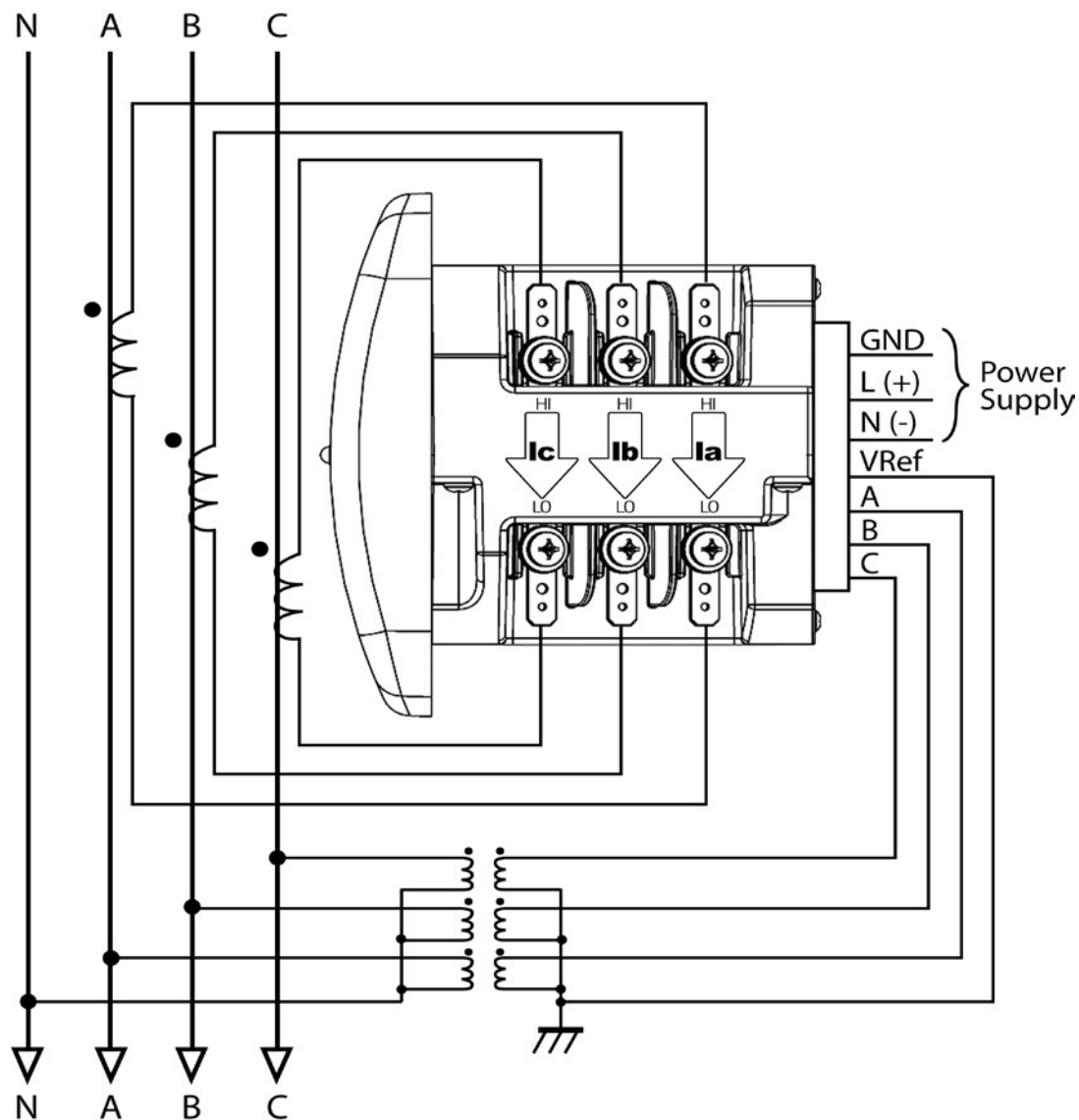
2. Service: 2.5 Element WYE, 4-Wire with No PTs, 3 CTs



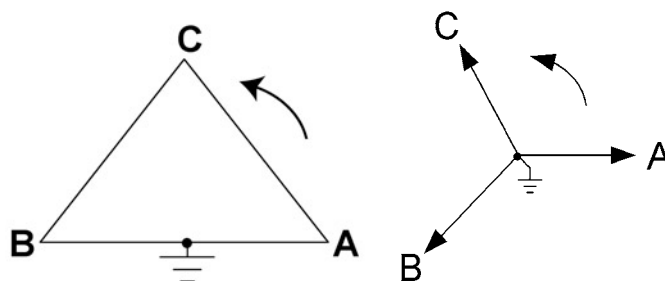
Select: “*2.5 EL WYE*” (2.5 Element Wye) from the IQ 250/260’s Front Panel Display. (See Chapter 6.)



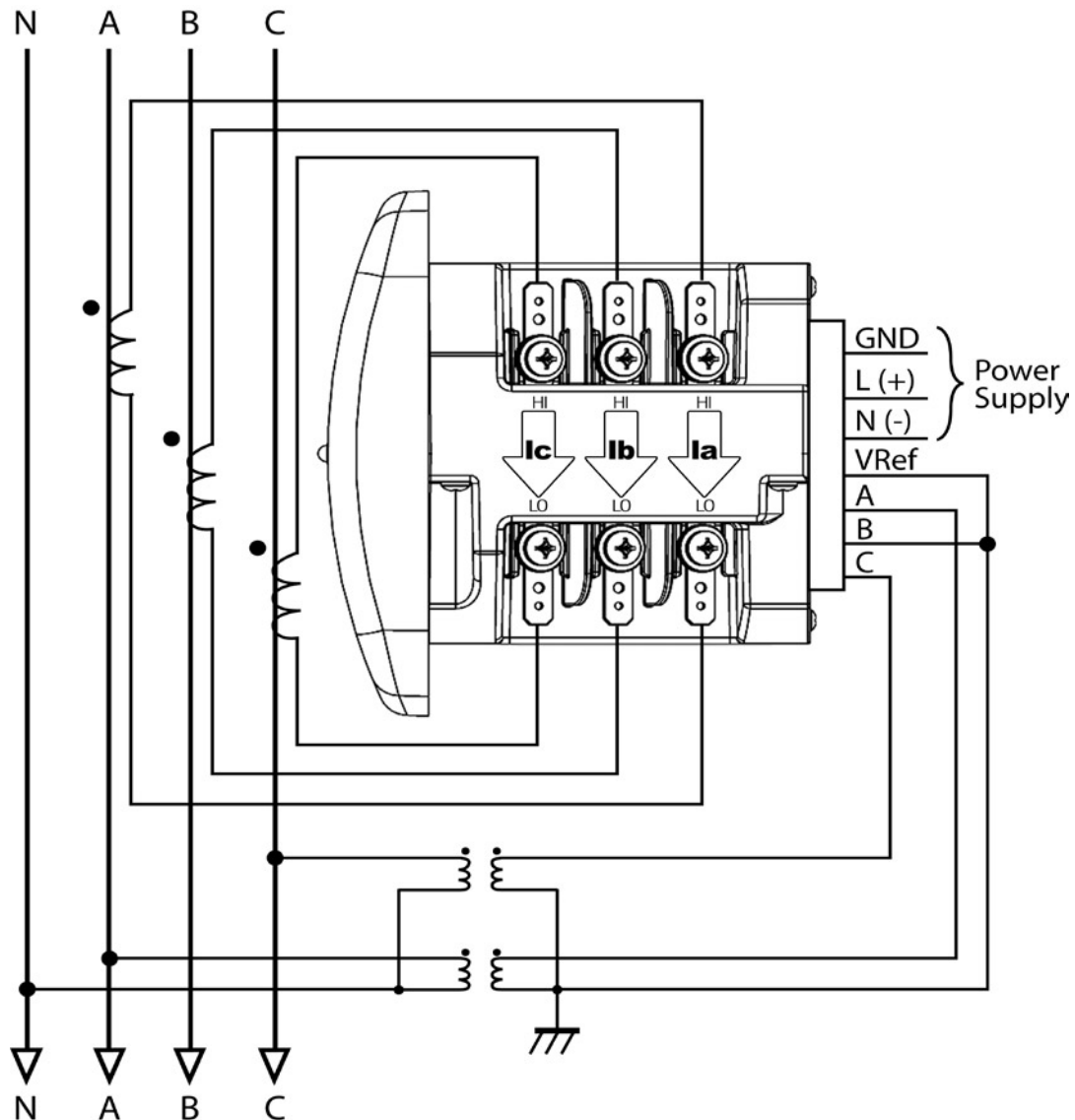
3. Service: WYE/Delta, 4-Wire with 3 PTs, 3 CTs



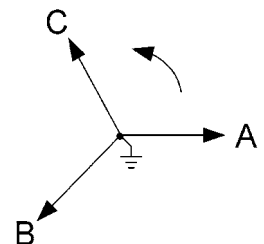
Select: “ *3 EL WYE* ” (3 Element Wye) from the IQ 250/260’s Front Panel Display. (See Chapter 6.)



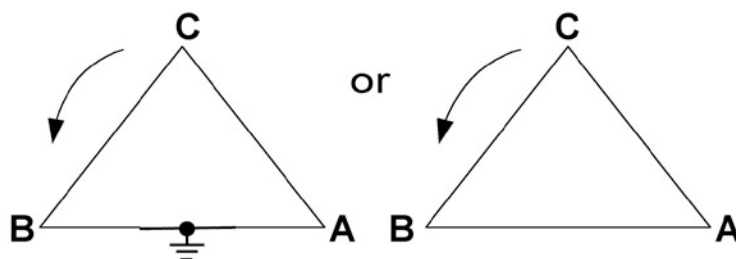
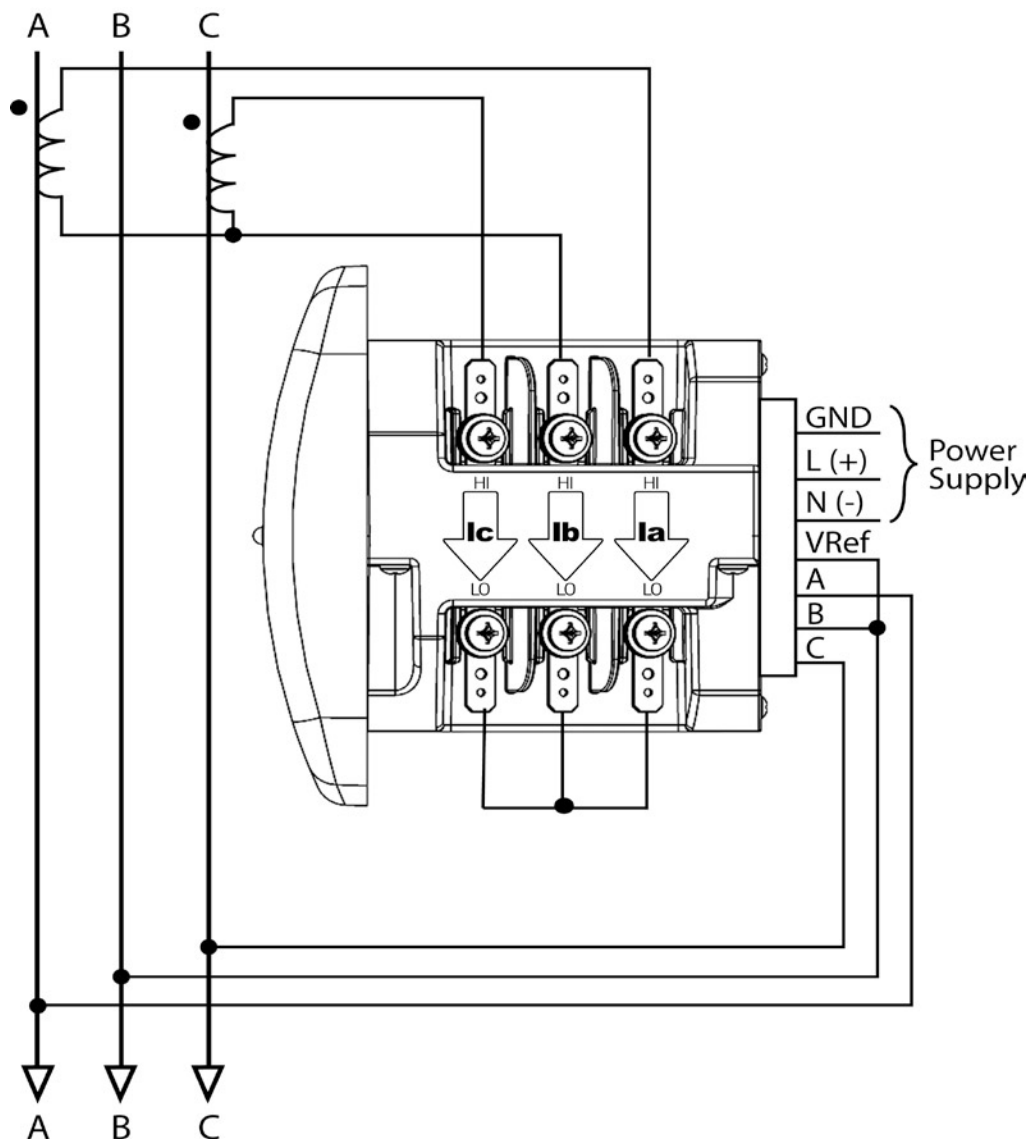
4. Service: 2.5 Element WYE, 4-Wire with 2 PTs, 3 CTs



Select: “*2.5 EL WYE*” (2.5 Element Wye) from the IQ 250/260’s Front Panel Display. (See Chapter 6.)



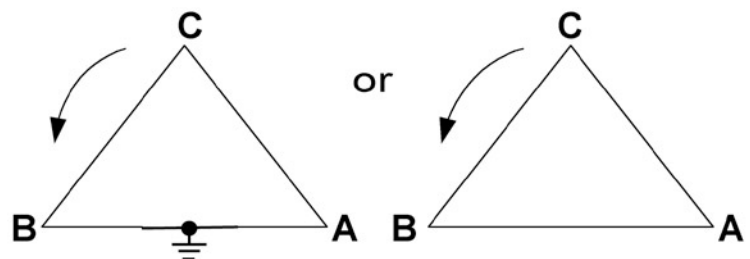
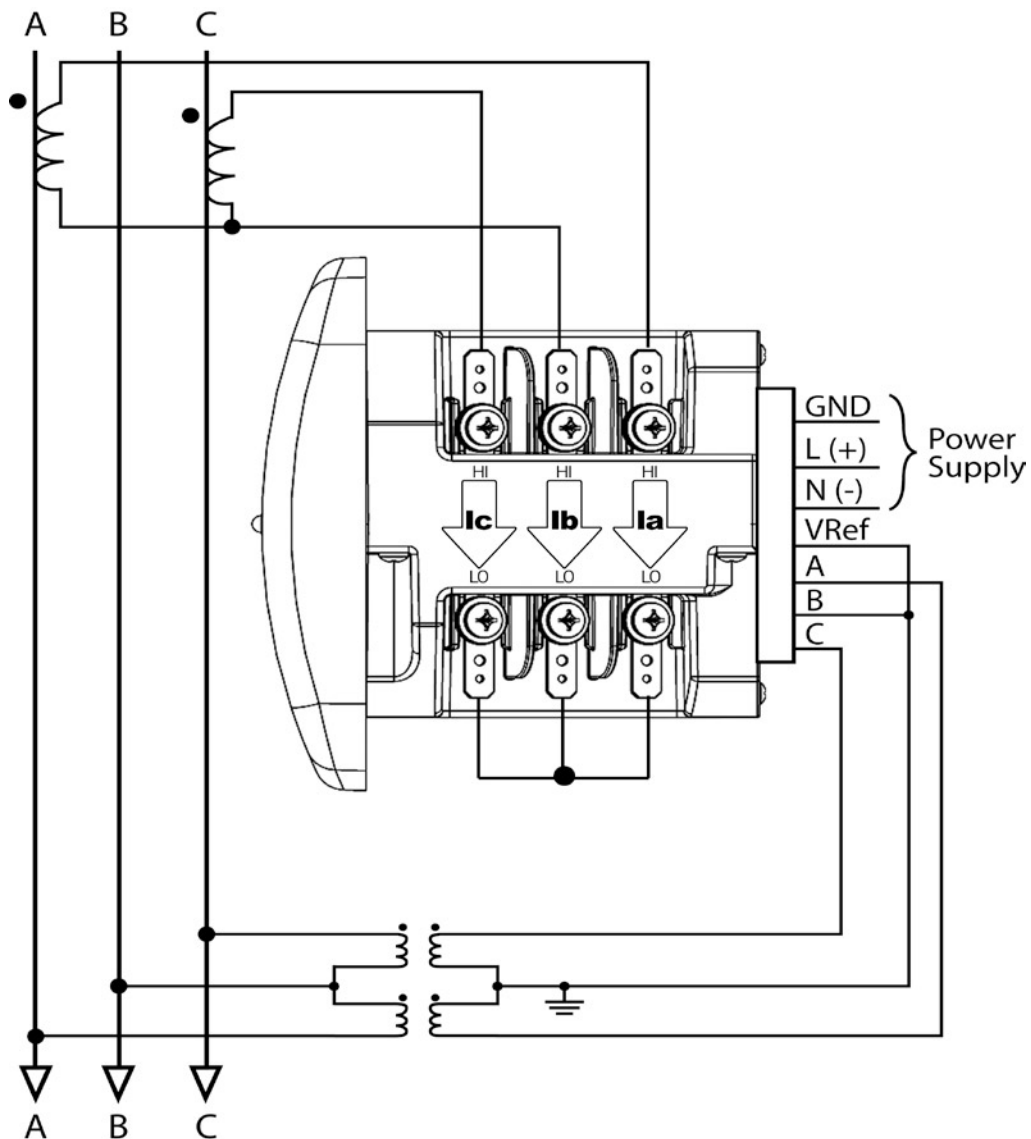
5. Service: Delta, 3-Wire with No PTs, 2 CTs



Select: “*2 CT DEL*” (2 CT Delta) from the IQ 250/260’s Front Panel Display. (See Chapter 6.)

Not connected to meter

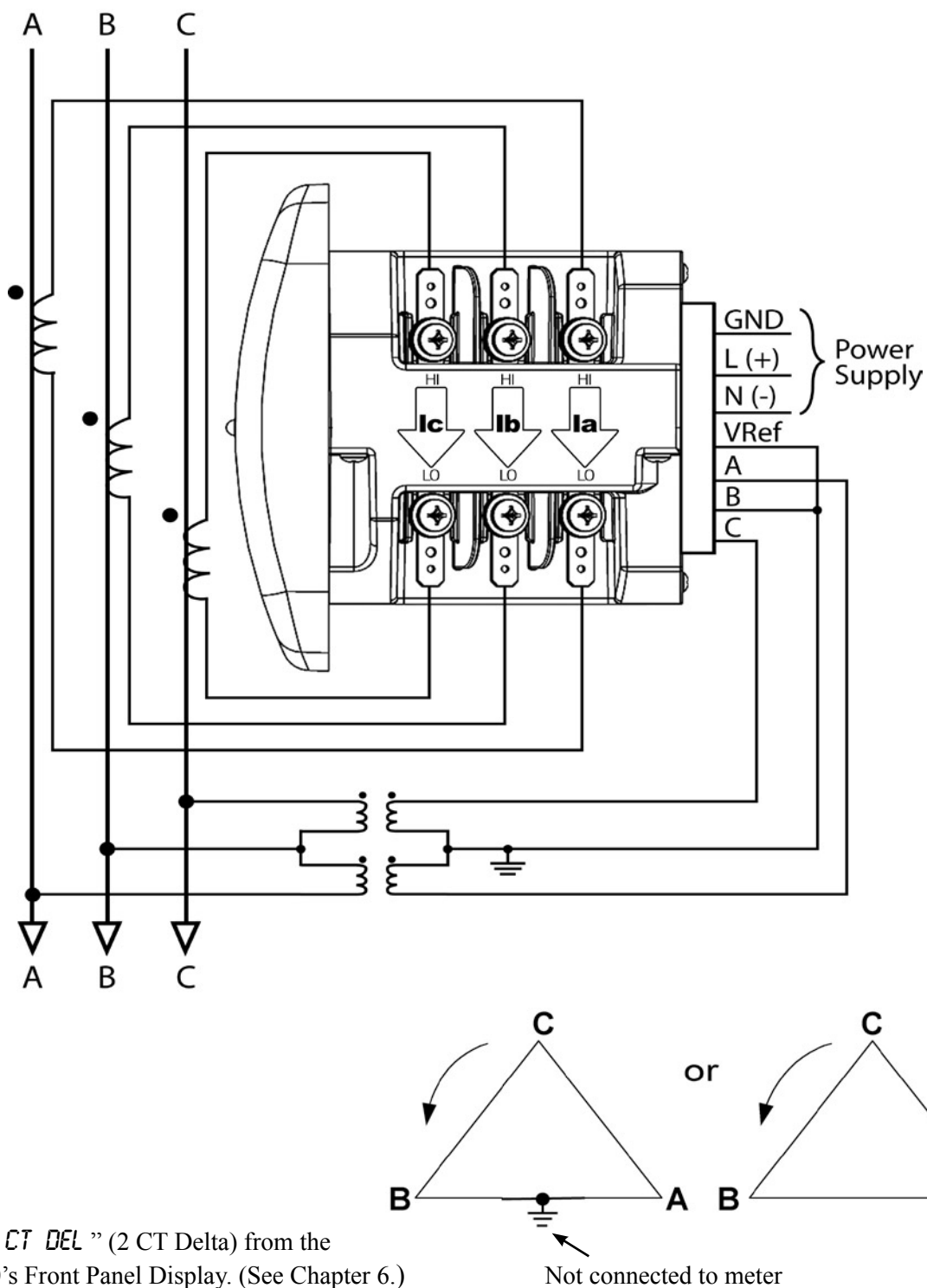
6. Service: Delta, 3-Wire with 2 PTs, 2 CTs



Select: “*2 CT DEL*” (2 CT Delta) from the IQ 250/260’s Front Panel Display. (See Chapter 6.)

Not connected to meter

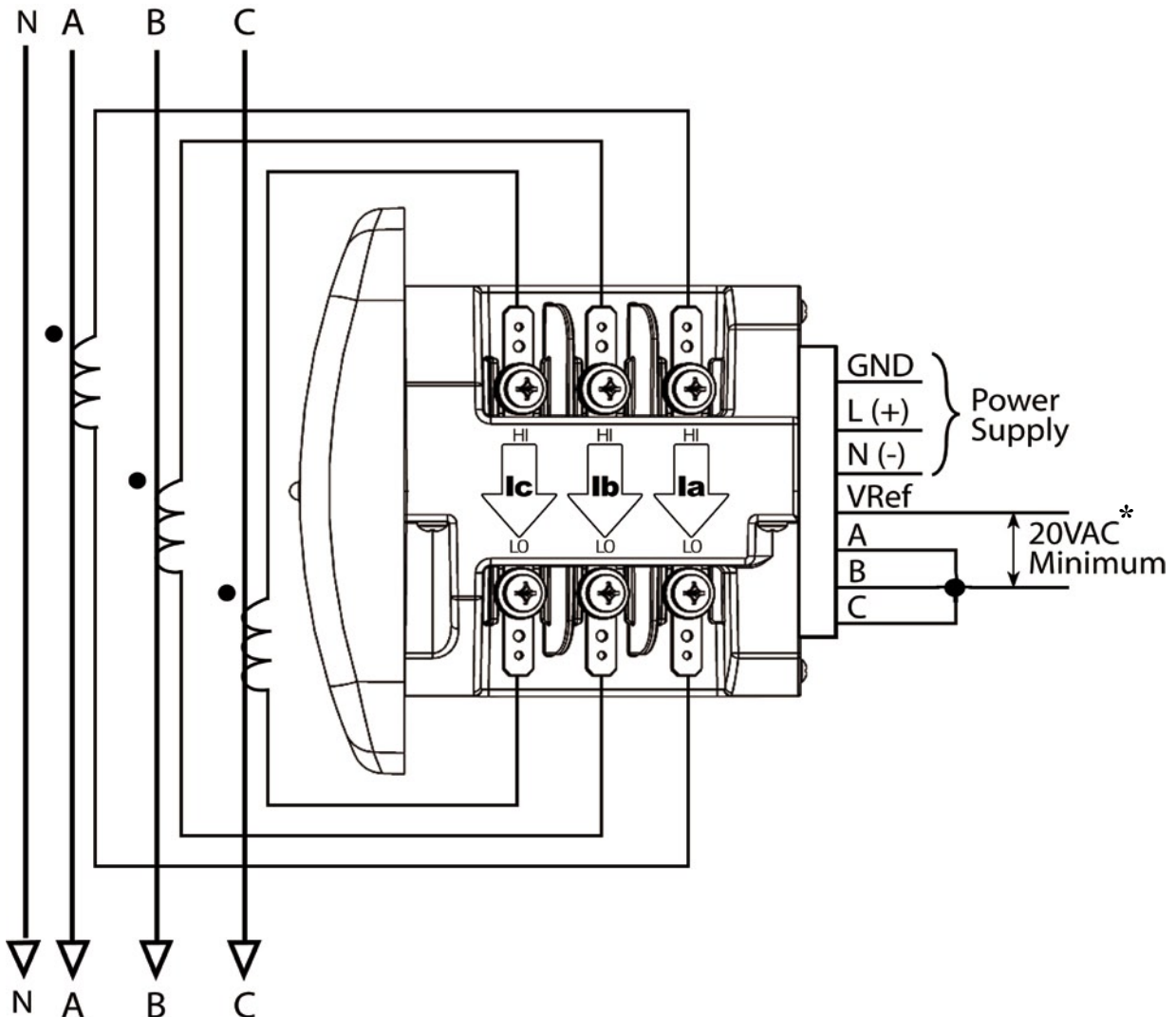
7. Service: Delta, 3-Wire with 2 PTs, 3 CTs



Select: “**2 CT DEL**” (2 CT Delta) from the IQ 250/260’s Front Panel Display. (See Chapter 6.)

NOTE: The third CT for hookup is optional and is for Current Measurement only.

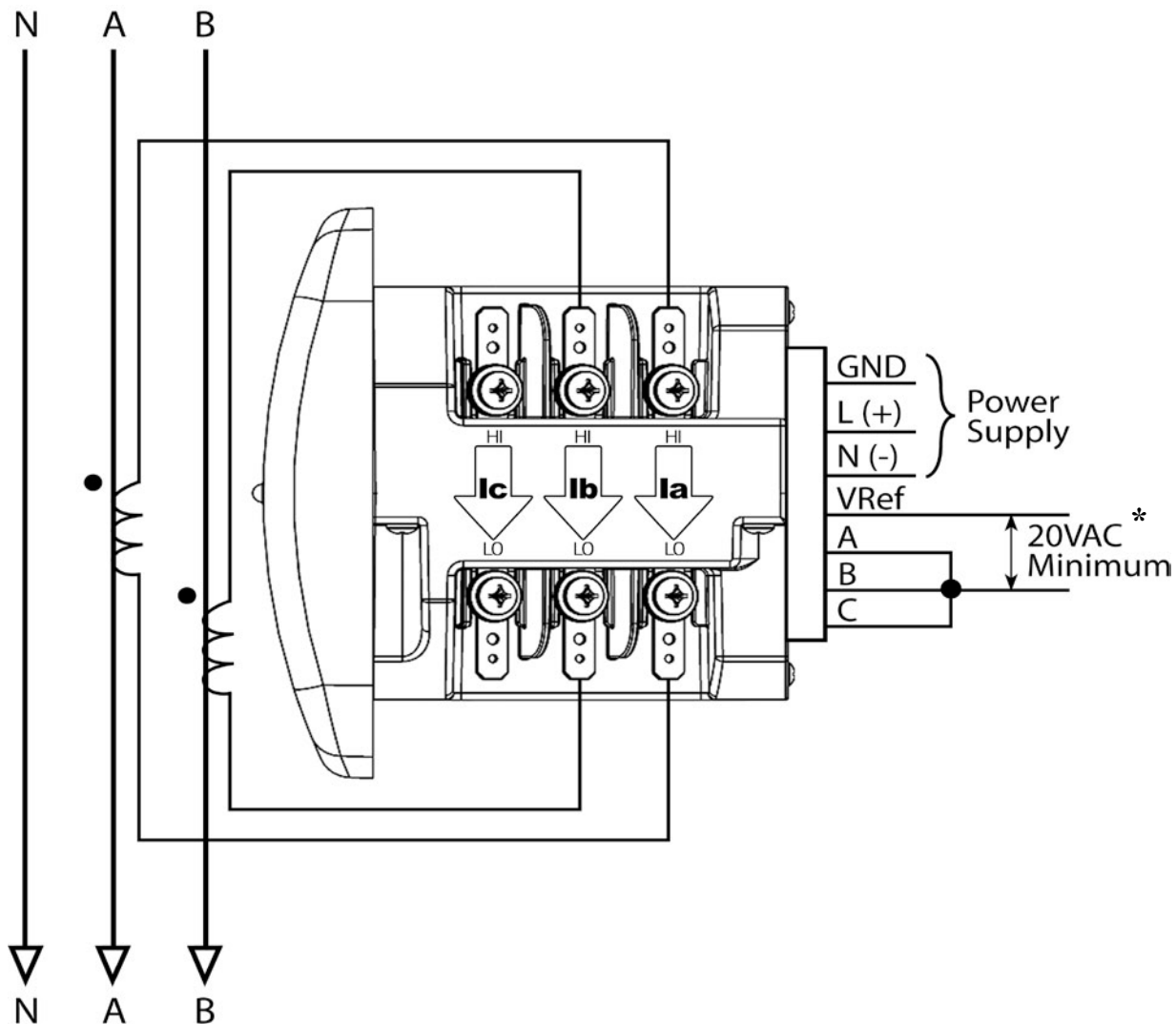
8. Service: Current Only Measurement (Three Phase)



Select: “*3 EL WYE*” (3 Element Wye) from the IQ 250/260’s Front Panel Display. (See Chapter 6.)

* For improved accuracy, this connection is recommended, but not required.

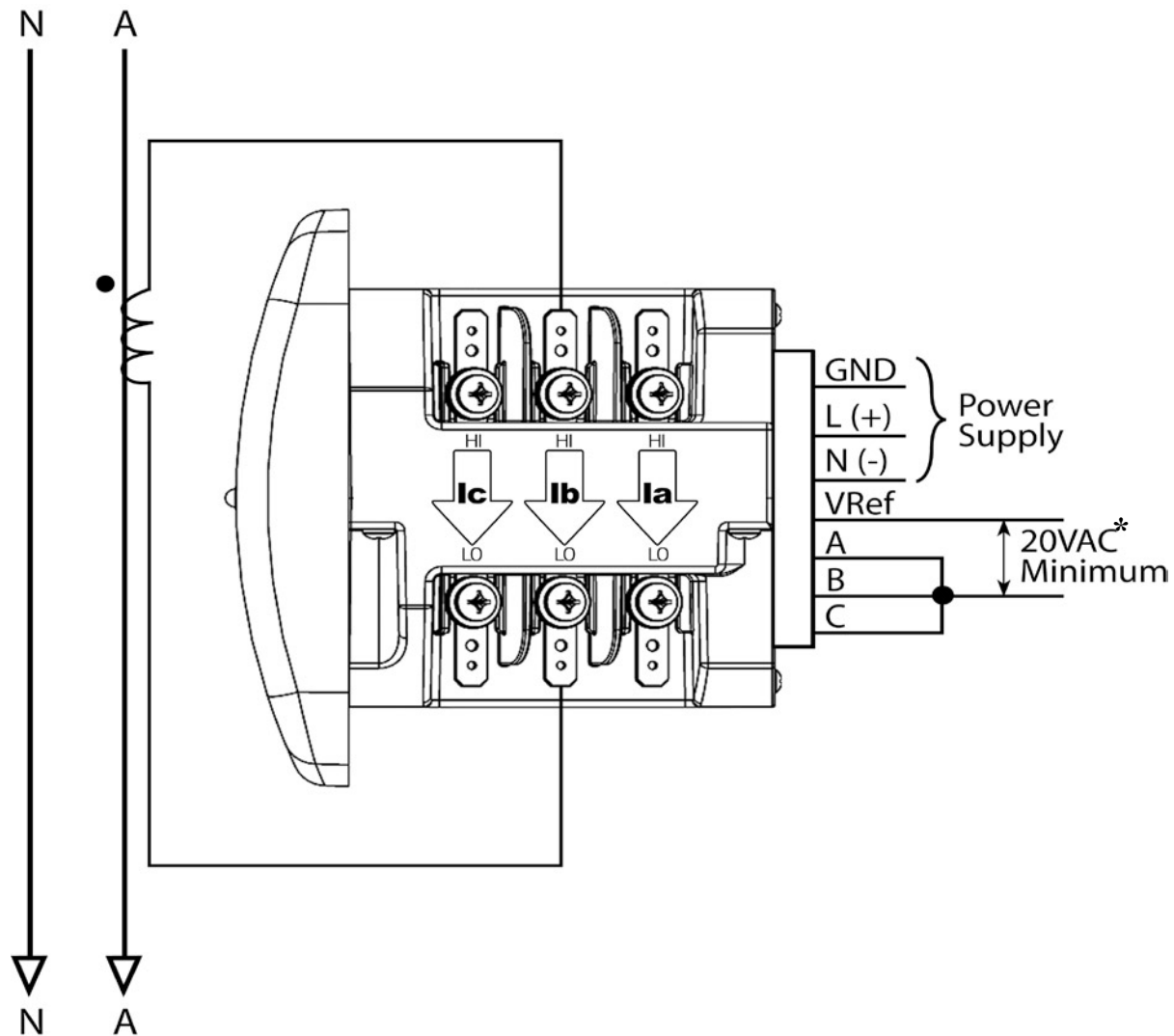
9. Service: Current Only Measurement (Dual Phase)



Select: “*3 EL WYE*” (3 Element Wye) from the IQ 250/260’s Front Panel Display. (See Chapter 6.)

* For improved accuracy, this connection is recommended, but not required.

10. Service: Current Only Measurement (Single Phase)



Select: “3 EL WYE” (3 Element Wye) from the IQ 250/260’s Front Panel Display. (See Chapter 6.)

* For improved accuracy, this connection is recommended, but not required.

5 Communication Installation

IQ 250/260 Communication

The IQ 250/260 Meter provides RS485 communication speaking Modbus ASCII, Modbus RTU, and DNP 3.0 protocols.

RS485 / KYZ Output (Com 2)

Com 2 provides a combination RS485 and an Energy Pulse Output (KYZ pulse). See Chapter 2 for the KYZ Output Specifications; see Chapter 6 for Pulse Constants.

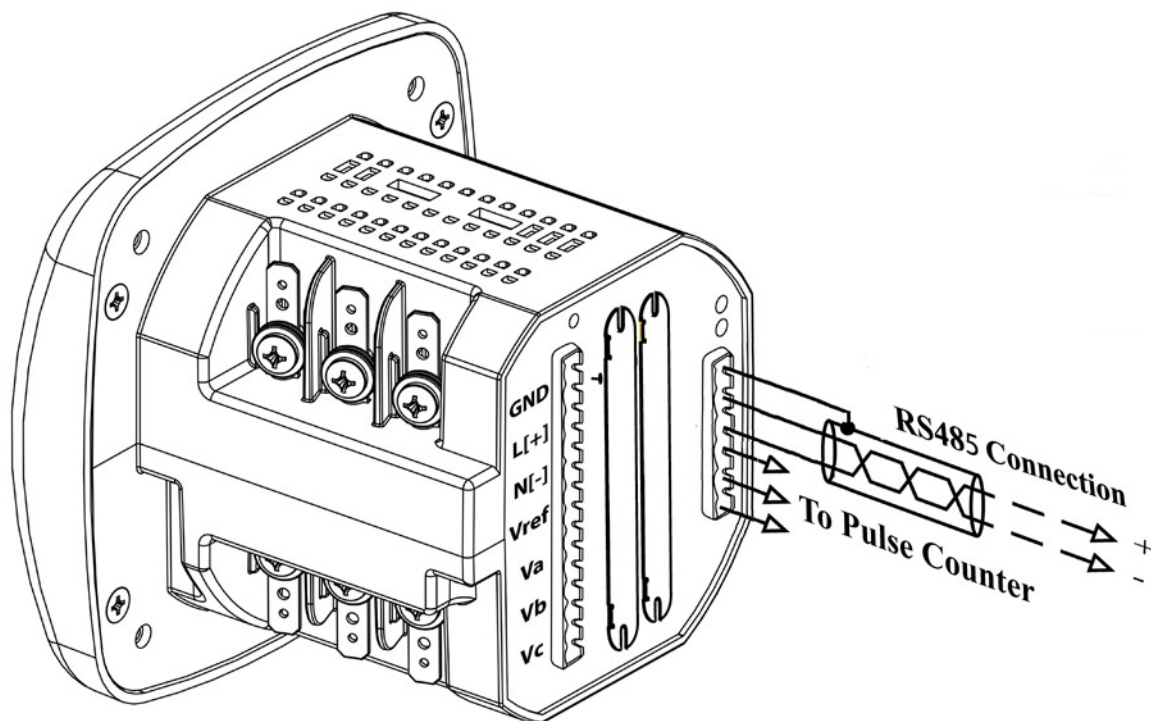


Figure 5.1: IQ 250/260 Back with RS485 Communication Installation

RS485 allows you to connect one or multiple IQ 250/260 meters to a PC or other device, at either a local or remote site. All RS485 connections are viable for up to 4000 feet (1219.20 meters).

Figure 5.2 shows the detail of a 2-wire RS485 connection.

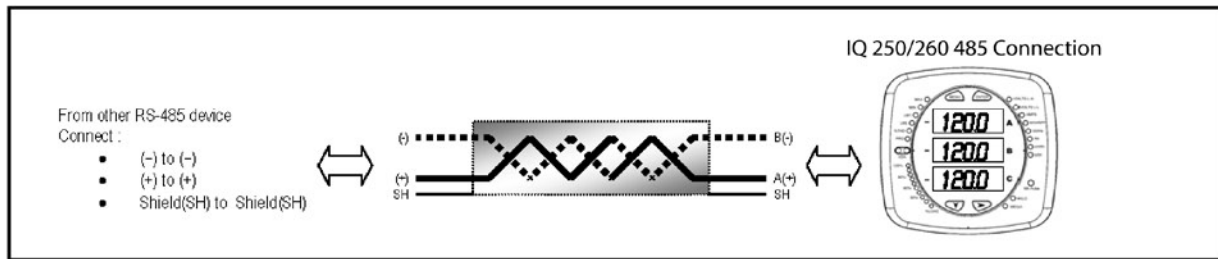


Figure 5.2: 2-wire RS485 Connection

NOTES:

For All RS485 Connections:

- Use a shielded twisted pair cable 22 AWG (0.33 mm²) or thicker, and ground the shield, preferably at one location only.
- Establish point-to-point configurations for each device on a RS485 bus: connect (+) terminals to (+) terminals; connect (-) terminals to (-) terminals.
- You may connect up to 31 meters on a single bus using RS485. Before assembling the bus, each meter must have a unique address: refer to Chapter 8 for instructions.
- Protect cables from sources of electrical noise.
- Avoid both “Star” and “Tee” connections (see Figure 5.4).
- **No more than two cables** should be connected **at any one point** on an RS485 network, whether the connections are for devices, converters, or terminal strips.
- Include all segments when calculating the total cable length of a network. If you are **not** using an RS485 repeater, the maximum length for cable connecting all devices is 4000 feet (1219.20 meters).
- Connect shield to RS485 Master and individual devices as shown in Figure 5.3. You may also connect the shield to earth-ground at one point.
- **Termination Resistors (R_T)** may be needed on both ends for longer length transmission lines. However, since the meter has some level of termination internally, Termination Resistors may not be needed. When they are used, the value of the Termination Resistors is determined by the electrical parameters of the cable.

Figure 5.3 shows a representation of an RS485 Daisy Chain connection.

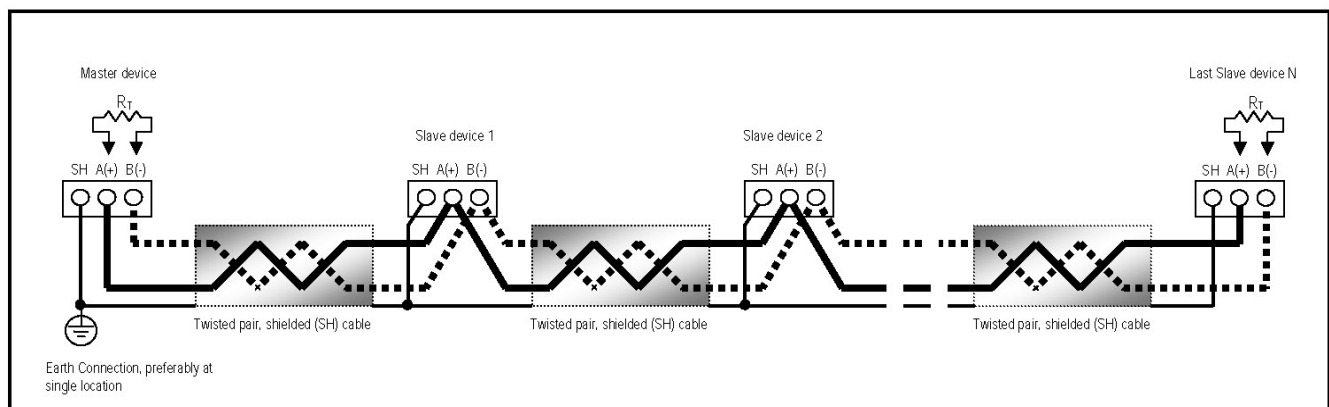


Figure 5.3: RS485 Daisy Chain Connection

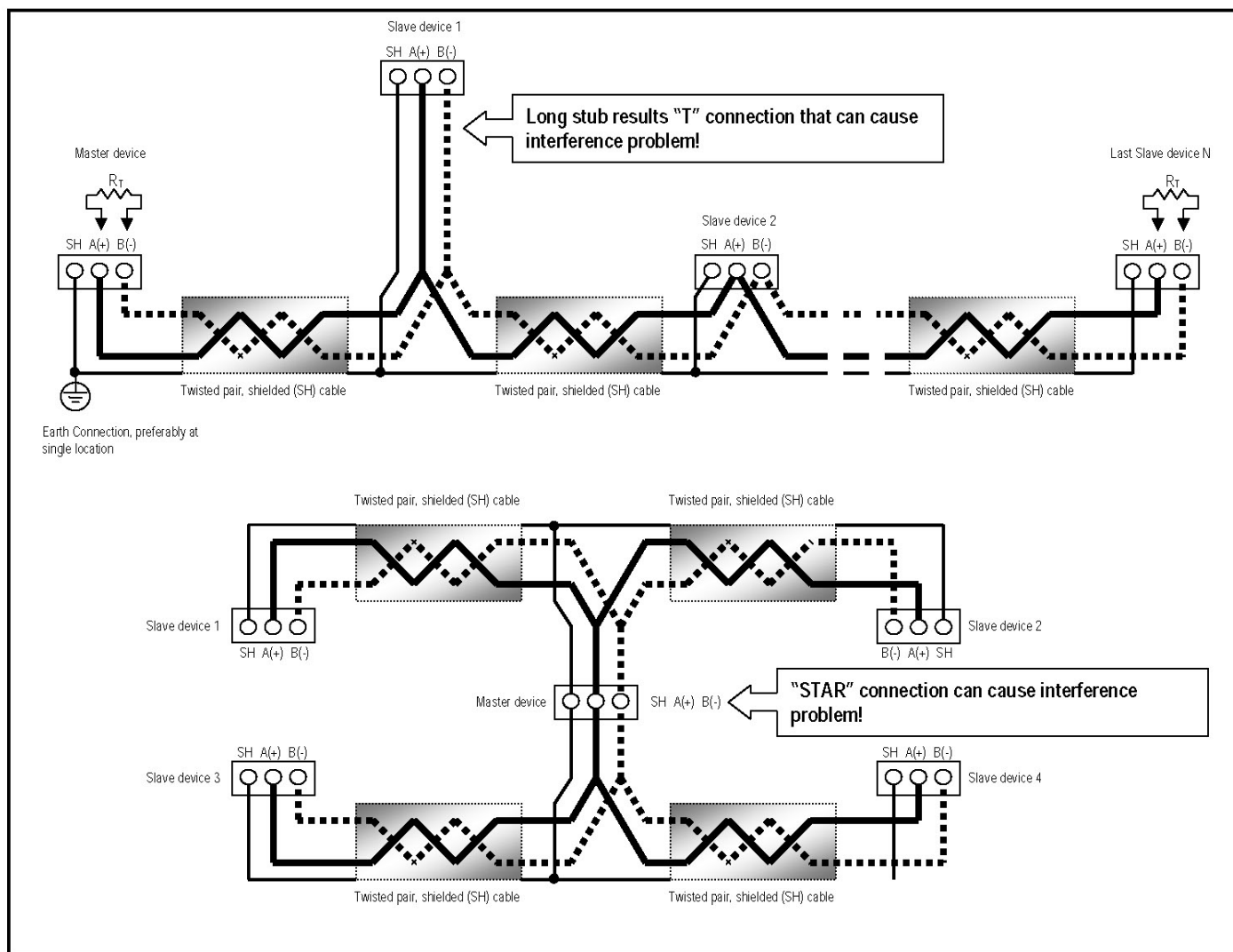


Figure 5.4: Incorrect "T" and "Star" Topologies

Using the Power Xpert® Gateway

The Power Xpert® Gateway allows an IQ 250/260 to communicate with a PC through a standard web browser. See the *Power Xpert® Gateway User Guide*, document number 164201670, for additional information.

IQ 250/260T Communication Information

The IQ 250/260T Transducer model does not include a display or buttons on the front face of the meter. Programming and communication utilize the RS485 connection on the back face of the meter shown in section 5.1.2. Once a connection is established, IQ 250/260 Configuration Software can be used to program the meter and communicate to IQ 250/260T slave devices. Refer to chapter 8 for instructions on using the software to program the meter.

Meter Connection

To provide power to the meter, attach an **Aux cable** to GND, L(+) and N(-) Refer to Chapter 4, Figure 1. The **RS485 cable** attaches to SH, B(-) and A(+) as shown in Figure 5.3 of this chapter.

6 Using the IQ 250/260

Introduction

You can use the **Elements** and **Buttons** on the IQ 250/260 meter's face to view meter readings, reset and/or configure the IQ 250/260, and perform related functions. The following sections explain the Elements and Buttons and detail their use.

Understanding Meter Face Elements

The meter face features the following elements:

- **Reading Type Indicator:**
Indicates Type of Reading
- **Parameter Designator:**
Indicates Reading Displayed
- **Watt-Hour Test Pulse:**
Energy Pulse Output to Test Accuracy
- **Scaling Factor:**
Kilo or Mega multiplier of Displayed Readings
- **% of Load Bar:**
Graphic Display of Amps as % of the Load

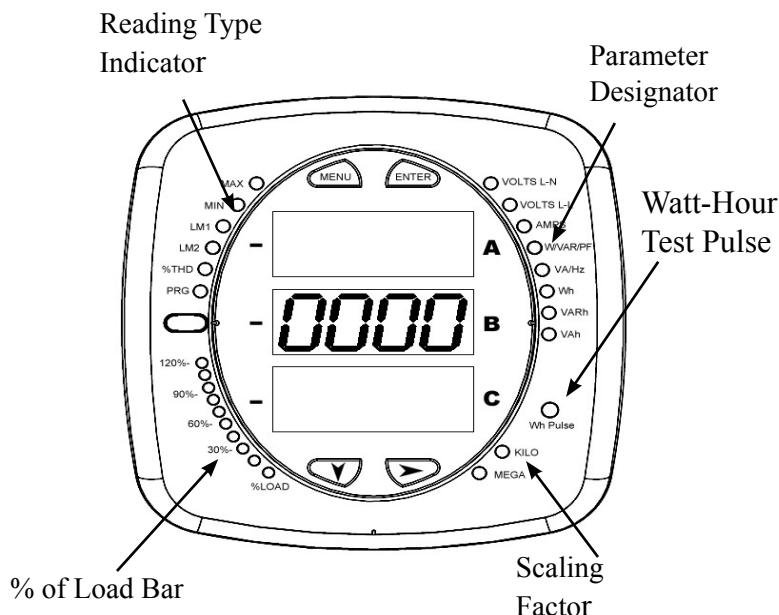


Figure 6.1: Face Plate of IQ 250/260 with Elements

Understanding Meter Face Buttons

The meter face has **Menu**, **Enter**, **Down** and **Right** buttons, which allow you to perform the following functions:

- View Meter Information
- Enter Display Modes
- Configure Parameters (may be Password Protected)
- Perform Resets (may be Password Protected)
- Perform LED Checks
- Change Settings
- View Parameter Values
- Scroll Parameter Values
- View Limit States

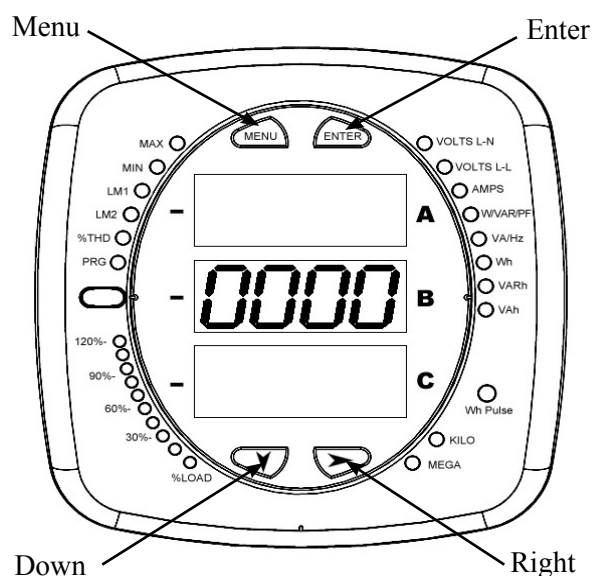


Figure 6.2: Face Plate of IQ 250/260 with Buttons

Using the Front Panel

You can access **four** modes using the IQ 250/260 front panel buttons:

- **Operating Mode** (Default)
- **Reset Mode**
- **Configuration Mode**
- **Information Mode**. **Information Mode** displays a sequence of screens that show model information, such as **Frequency** and **Amps**.

Use the **Menu**, **Enter**, **Down** and **Right** buttons to navigate through each mode and its related screens.

NOTES:

- *Appendix A* contains the complete **Navigation Map** for the front panel display modes and their screens.
- The meter can also be configured using **software**; see Chapter 8 for instructions.

Understanding Startup and Default Displays

Upon Power Up, the meter displays a sequence of screens:

- **Lamp Test Screen** where all LEDs are lit
- **Lamp Test Screen** where all digits are lit
- **Firmware Screen** showing build number
- **Error Screen** (if an error exists).

After startup, if auto-scrolling is enabled, the IQ 250/260 scrolls the parameter readings on the right side of the front panel. The Kilo or Mega LED lights, showing the scale for the Wh, VARh and VAh readings. Figure 6.3 shows an example of a Wh reading.

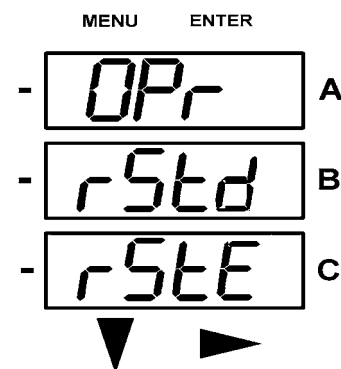
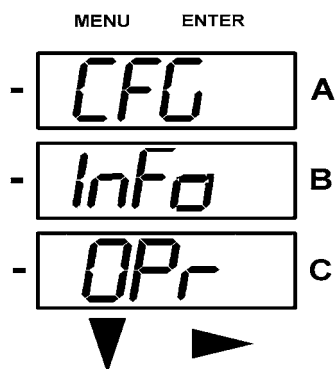
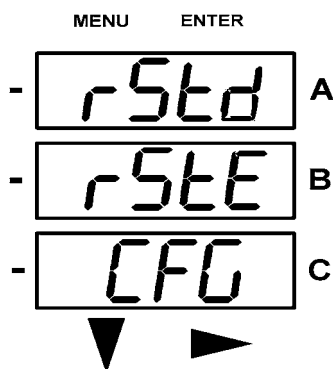
The IQ 250/260 continues to provide scrolling readings until one of the buttons on the front panel is pressed, causing the meter to enter one of the other Modes.



Figure 6.3: Wh Reading

Using the Main Menu

- Press the **Menu** button. The Main Menu screen appears.
 - The **Reset: Demand** mode (**rStd**) appears in the A window. Use the **Down** button to scroll, causing the **Reset: Energy** (**rStE**), **Configuration** (**CFG**), **Operating** (**OPr**), and **Information** (**InFo**) modes to move to the A window.
 - The mode that is currently flashing in the A window is the “**Active**” mode, which means it is the mode that can be configured.



For example: Press **Down** Twice-

CFG moves to A window. Press **Down** Twice - **OPr** moves to A window.

- Press the **Enter** button from the Main Menu to view the Parameters screen for the mode that is currently active.

Using Reset Mode

Reset Mode has **two options**:

- Reset: Demand** (**rStd**): resets the Max and Min values.
- Reset: Energy** (**rStE**): resets the energy accumulator fields.

Press the **Enter** button while either **rStd** or **rStE** is in the A window. The **Reset Demand No** or **Reset Energy No** screen appears.

- If you press the **Enter** button again, the Main Menu appears, with **the next mode** in the A window. (The **Down** button does not affect this screen.)

- If you press the **Right** button, the **Reset Demand YES** or **Reset Energy YES** screen appears.

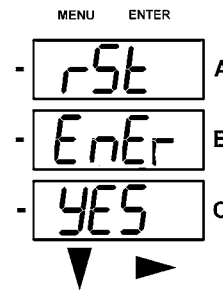
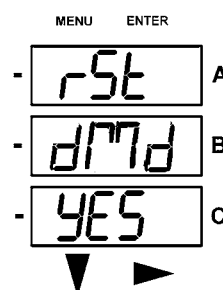
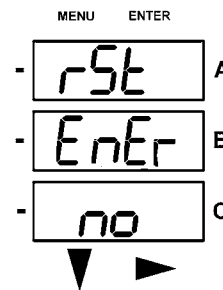
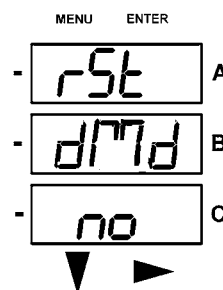
Press **Enter** to perform a reset.

NOTE: If Password Protection is enabled for Reset, you must enter the four digit Password before you can reset the meter. (See Chapter 8 for information on Password Protection.)

To enter a password, follow the instructions on the next page.

CAUTION! Reset Demand YES resets **all** Max and Min values.

Once you have performed a reset, the screen displays either “**rSt dMd donE**” or “**rSt EnEr donE**” and then resumes auto-scrolling parameters.



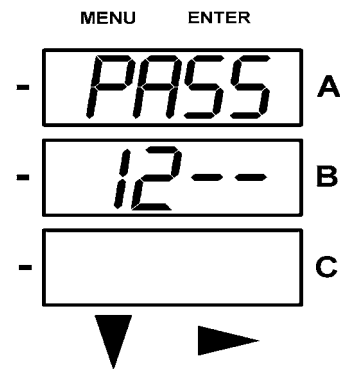
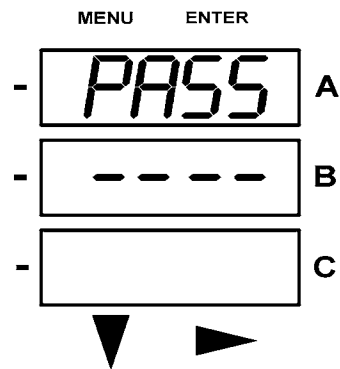
Entering a Password

If Password Protection has been enabled in the software for Reset and/or Configuration (see Chapter 8 for information), a screen appears requesting a Password when you try to reset the meter and/or configure settings through the front panel.

- **PASS** appears in the A window and 4 dashes appear in the B window. The leftmost dash is flashing.

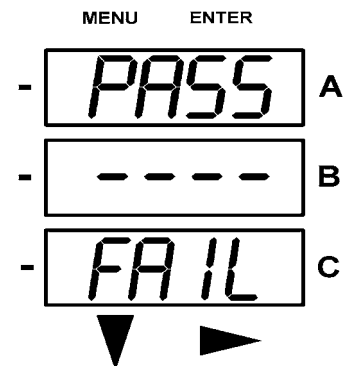
1. Press the **Down** button to scroll numbers from 0 to 9 for the flashing dash. When the correct number appears for that dash, use the the **Right** button to move to the next dash.

Example: The left screen, below, shows four dashes. The right screen shows the display after the first two digits of the password have been entered.



2. When all 4 digits of the password have been selected, press the **Enter** button.

- If you are in **Reset Mode** and the correct Password has been entered, “rSt dMd donE” or “rSt EnEr donE” appears and the screen resumes auto-scrolling parameters.
- If you are in **Configuration Mode** and the correct Password has been entered, the display returns to the screen that required a password.
- If an incorrect Password has been entered, “PASS ---- FAIL” appears, and:
 - The previous screen is redisplayed, if you are in **Reset Mode**.
 - The previous Operating Mode screen is redisplayed, if you are in **Configuration Mode**.



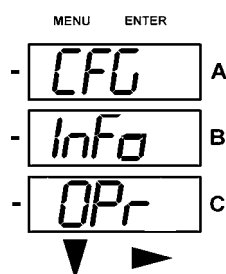
Using Configuration Mode

Configuration Mode follows Reset: Energy on the Main Menu.

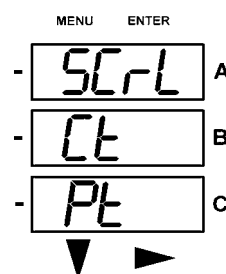
To access **Configuration Mode**:

1. Press the **Menu** button while the meter is auto-scrolling parameters.
2. Press the **Down** button until the Configuration Mode option (**CFG**) is in the A window.
3. Press the **Enter** button. The **Configuration Parameters** screen appears.
4. Press the **Down** button to scroll through the configuration parameters: **Scroll (SCrL)**, **CT**, **PT**, **Connection (Cnct)** and **Port**. The parameter currently 'Active,' i.e., configurable, flashes in the A window.
5. Press the **Enter** button to access the Setting screen for the currently active parameter.

NOTE: You can use the **Enter** button to scroll through all of the **Configuration** parameters and their **Setting** screens, in order.



Press **Enter** when CFG is in A window -



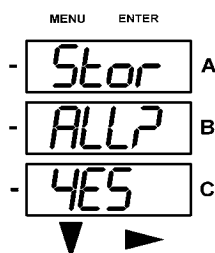
Parameter screen appears - Press **Down**-

Press **Enter** when Parameter you want is in A window

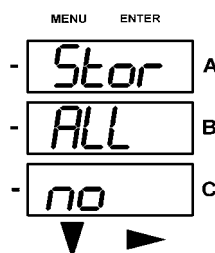
6. The parameter screen appears, showing the current settings. To change the settings:
 - Use either the **Down** button or the **Right** button to select an option.
 - To enter a number value, use the **Down** button to select the number value for a digit and the **Right** button to move to the next digit.

NOTE: When you try to change the current setting and Password Protection is enabled for the meter, the Password screen appears. **See the previous page for instructions on entering a password.**

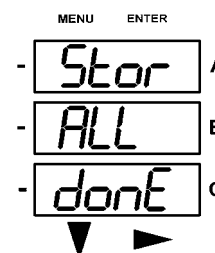
7. Once you have entered the new setting, press the **Menu** button twice.
8. The **Store ALL YES** screen appears. You can either:
 - Press the **Enter** button to **save** the new setting.
 - Press the **Right** button to access the **Store ALL no** screen; then press the **Enter** button to **cancel** the Save.
9. If you have saved the settings, the **Store ALL done** screen appears and the meter resets.



Press the **Enter** button to save the settings



Press the **Enter** button to



The settings have been saved

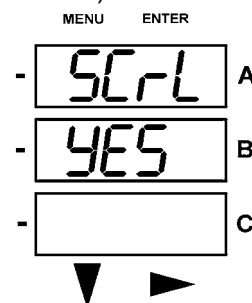
Configuring the Scroll Feature

When in **Auto Scroll** mode, the meter performs a scrolling display, showing each parameter for 7 seconds, with a 1 second pause between parameters. The parameters that the meter displays are determined by the following conditions:

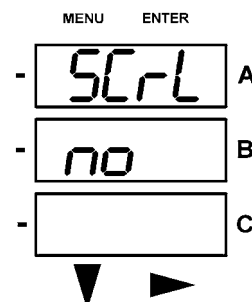
- They have been selected through software. (Refer to Chapter 8 for instructions.)
- Whether your meter model is an IQ 250 or IQ 260.

To enable or disable Auto-scrolling:

1. Press the **Enter** button when **SCrl** is in the A window.
The **Scroll YES** screen appears.



2. Press either the **Right** or **Down** button if you want to access the **Scroll no** screen.
To return to the **Scroll YES** screen, press either button.



3. Press the **Enter** button on either the **Scroll YES** screen (to enable auto-scrolling) or the **Scroll no** screen (to disable auto-scrolling).
The **CT- n** screen appears (this is the next Configuration mode parameter).

NOTE:

- To exit the screen without changing scrolling options, press the **Menu** button.
- To return to the Main Menu screen, press the **Menu** button twice.
- To return to the scrolling (or non-scrolling) parameters display, press the **Menu** button three times.

Configuring CT Setting

The CT Setting has three parts: **Ct-n** (numerator), **Ct-d** (denominator), and **Ct-S** (scaling).

1. Press the **Enter** button when Ct is in the A window.

The **Ct-n** screen appears. You can either:

- Change the value for the CT numerator.
- Access one of the other CT screens by pressing the Enter button: press Enter once to access the **Ct-d** screen, twice to access the **Ct-S** screen.

NOTE: The Ct-d screen is preset to a 5 amp or 1 amp value at the factory and cannot be changed.

- a. To change the value for the CT numerator

From the Ct-n screen:

- Use the **Down** button to select the number value for a digit.
- Use the **Right** button to move to the next digit.

- b. To change the value for CT scaling

From the Ct-S screen:

Use the **Right** button or the **Down** button to choose the scaling you want. The Ct-S setting can be **1**, **10**, or **100**.

NOTE: If you are prompted to enter a password, refer to the instructions earlier in the chapter.

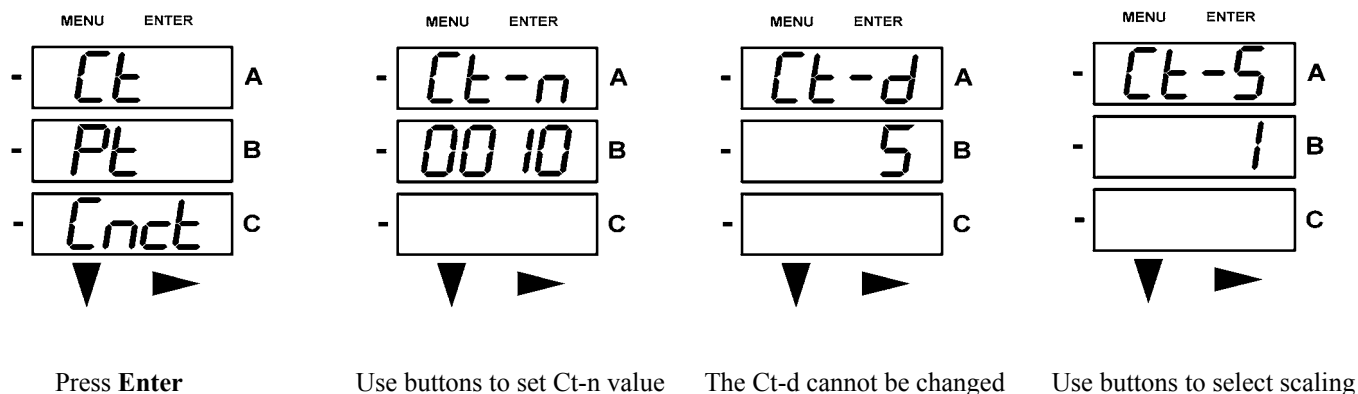
2. When the new setting is entered, press the **Menu** button twice.
3. The **Store ALL YES** screen appears. Press **Enter** to save the new CT setting.

Example CT Settings:

200/5 Amps:	Set the Ct-n value for 200 and the Ct-S value for 1.
800/5 Amps:	Set the Ct-n value for 800 and the Ct-S value for 1.
2,000/5 Amps:	Set the Ct-n value for 2000 and the Ct-S value for 1.
10,000/5 Amps:	Set the Ct-n value for 1000 and the Ct-S value for 10.

NOTES:

- The value for Amps is a product of the Ct-n value and the Ct-S value.
- Ct-n and Ct-S are dictated by primary current; Ct-d is secondary current.



Configuring PT Setting

The PT Setting has three parts: **Pt-n** (numerator), **Pt-d** (denominator), and **Pt-S** (scaling).

1. Press the **Enter** button when Pt is in the A window.

The **PT-n** screen appears. You can either:

- Change the value for the PT numerator.
- Access one of the other PT screens by pressing the **Enter** button: press **Enter** once to access the **Pt-d** screen, twice to access the **Pt-S** screen.

- a. To change the value for the PT numerator or denominator

From the Pt-n or Pt-d screen:

- Use the **Down** button to select the number value for a digit.
- Use the **Right** button to move to the next digit.

- b. To change the value for the PT scaling

From the Pt-S screen:

Use the **Right** button or the **Down** button to choose the scaling you want. The Pt-S setting can be **1**, **10**, **100**, or **1000**.

NOTE: If you are prompted to enter a password, refer to the instructions earlier in this chapter.

2. When the new setting is entered, press the **Menu** button twice.
3. The **STOR ALL YES** screen appears. Press Enter to save the new PT setting.

Example Settings:

277/277 Volts:

Pt-n value is 277, Pt-d value is 277, Pt-S value is 1.

14,400/120 Volts:

Pt-n value is 1440, Pt-d value is 120, Pt-S value is 10.

138,000/69 Volts:

Pt-n value is 1380, Pt-d value is 69, Pt-S value is 100.

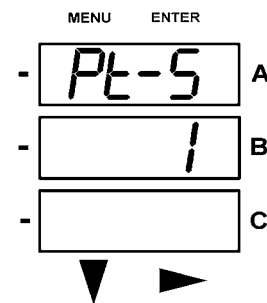
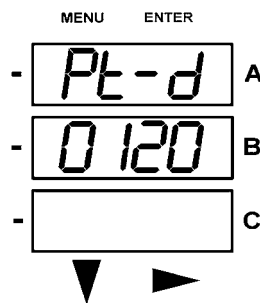
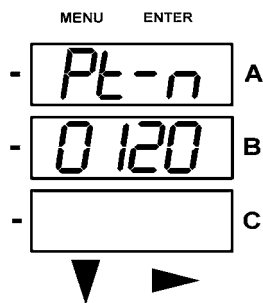
345,000/115 Volts:

Pt-n value is 3450, Pt-d value is 115, Pt-S value is 100.

345,000/69 Volts:

Pt-n value is 345, Pt-d value is 69, Pt-S value is 1000.

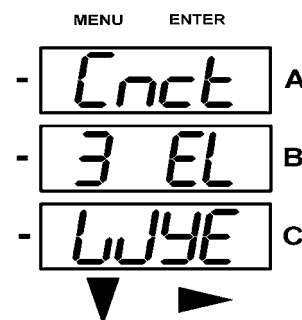
NOTE: Pt-n and Pt-S are dictated by primary voltage; Pt-d is secondary voltage.



Use □

Configuring Connection Setting

1. Press the **Enter** button when **Cnct** is in the A window. The **Cnct** screen appears.
2. Press the **Right** button or **Down** button to select a configuration.
The choices are:
 - 3 Element Wye (3 EL WYE)
 - 2.5 Element Wye (2.5EL WYE)
 - 2 CT Delta (2 Ct dEL)**NOTE: If you are prompted to enter a password, refer to the instructions earlier in this chapter.**
3. When you have made your selection, press the **Menu** button twice.
4. The **STOR ALL YES** screen appears. Press **Enter** to save the setting.

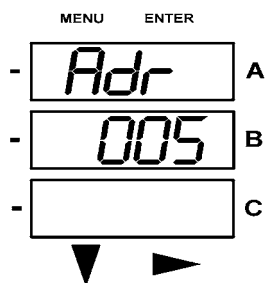


Use buttons to select configuration

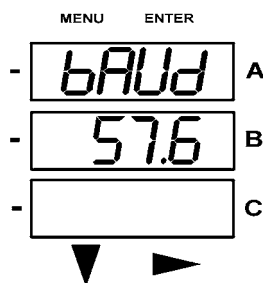
Configuring Communication Port Setting

Port configuration consists of : **Address** (a three digit number), **Baud Rate** (9600; 19200; 38400; or 57600), and **Protocol** (DNP 3.0; Modbus RTU; or Modbus ASCII).

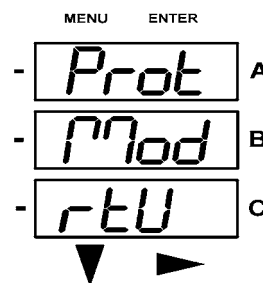
1. Press the **Enter** button when **Port** is in the A window.
The **Adr** (address) screen appears. You can either:
 - Enter the address.
 - Access one of the other Port screens by pressing the **Enter** button: press **Enter** once to access the **bAUD** screen (Baud Rate); press **Enter** twice to access the **Prot** screen (Protocol).
 - a. **To enter the Address, from the Adr screen:**
 - Use the **Down** button to select the number value for a digit.
 - Use the **Right** button to move to the next digit.
 - b. **To select the Baud Rate, from the bAUD screen:**
Use the **Right** button or the **Down** button to select the setting you want.
 - c. **To select the Protocol, from the Prot screen:**
Press the **Right** button or the **Down** button to select the setting you want.**NOTE: If you are prompted to enter a password, refer to the instructions earlier in this chapter.**
2. When you have finished making your selections, press the **Menu** button twice.
3. The **STOR ALL YES** screen appears. Press **Enter** to save the settings.



Use buttons to enter Address



Use buttons to select Baud Rate



Use buttons to select Protocol

Using Operating Mode

Operating Mode is the IQ 250/260 meter's default mode, that is, the standard front panel display. After Startup, the meter automatically scrolls through the parameter screens, if scrolling is enabled. Each parameter is shown for 7 seconds, with a 1 second pause between parameters. Scrolling is suspended for 3 minutes after any button is pressed.

1. Press the **Down** button to scroll all the parameters in **Operating Mode**. The currently "Active," i.e., displayed, parameter has the Indicator light next to it, on the right face of the meter.
2. Press the **Right** button to view additional readings for that parameter. The table below shows possible readings for Operating Mode. **Sheet 2** in *Appendix A* shows the Operating Mode Navigation Map.

NOTE: Readings or groups of readings are skipped if not applicable to the meter type or hookup, or if they are disabled in the programmable settings.

OPERATING MODE PARAMETER READINGS

POSSIBLE READINGS

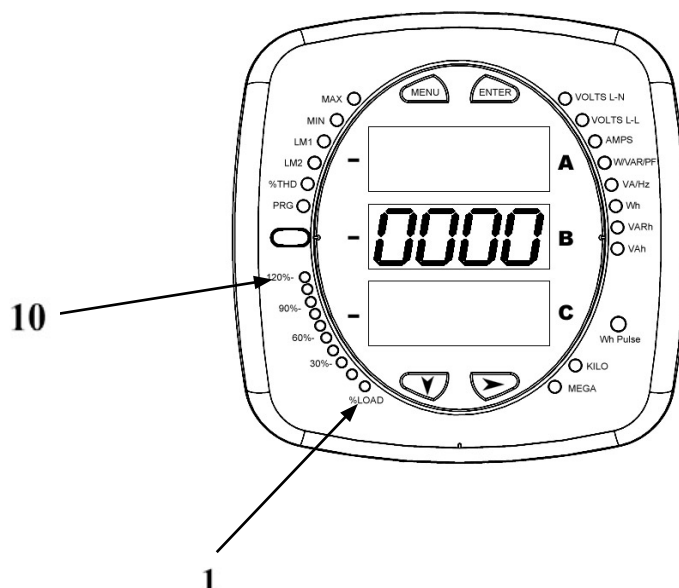
VOLTS L-N	VOLTS_LN	VOLTS_LN_ MAX	VOLTS_LN_ MIN			VOLTS_LN_ THD
VOLTS L-L	VOLTS_LL	VOLTS_LL_ MAX	VOLTS_LL_ MIN			
AMPS	AMPS	AMPS_ NEUTRAL	AMPS_ MAX	AMPS_MIN		AMPS_THD
W/VAR/PF	W_VAR_PF	W_VAR_ PF_MAX_ POS	W_VAR_ PF_MIN_ POS	W_VAR_ PF_MIN_ NEG		
VA/Hz	VA_FREQ	VA_FREQ_ MAX	VA_FREQ_ MIN			
Wh	KWH_REC	KWH_DEL	KWH_NET	KWH_TOT		
VARh	KVARH_ POS	KVARH_ NEG	KVARH_ NET	KVARH_ TOT		
VAh	KVAH					

Understanding the % of Load Bar

The 10-segment LED bar graph at the bottom left of the IQ 250/260 front panel provides a graphic representation of Amps. The segments light according to the load, as shown in the % Load Segment Table below. When the Load is over 120% of Full Load, all segments flash “On” (1.5 secs) and “Off” (0.5 secs).

% of Load Segment Table

Segments	Load >= % Full Load
none	no load
1	1%
1-2	15%
1-3	30%
1-4	45%
1-5	60%
1-6	72%
1-7	84%
1-8	96%
1-9	108%
1-10	120%
All Blink	>120%



Performing Watt-Hour Accuracy Testing (Verification)

To be certified for revenue metering, power providers and utility companies must verify that the billing energy meter performs to the stated accuracy. To confirm the meter's performance and calibration, power providers use field test standards to ensure that the unit's energy measurements are correct. Since the IQ 250/260 is a traceable revenue meter, it contains a utility grade test pulse that can be used to gate an accuracy standard. This is an essential feature required of all billing grade meters.

- Refer to Figure 6.5 for an example of how this process works.
- Refer to Table 6.1 for the Wh/Pulse Constants for Accuracy Testing.

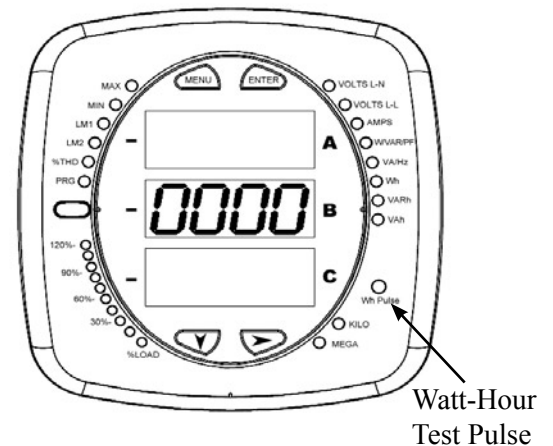


Figure 6.4: Watt-Hour Test Pulse

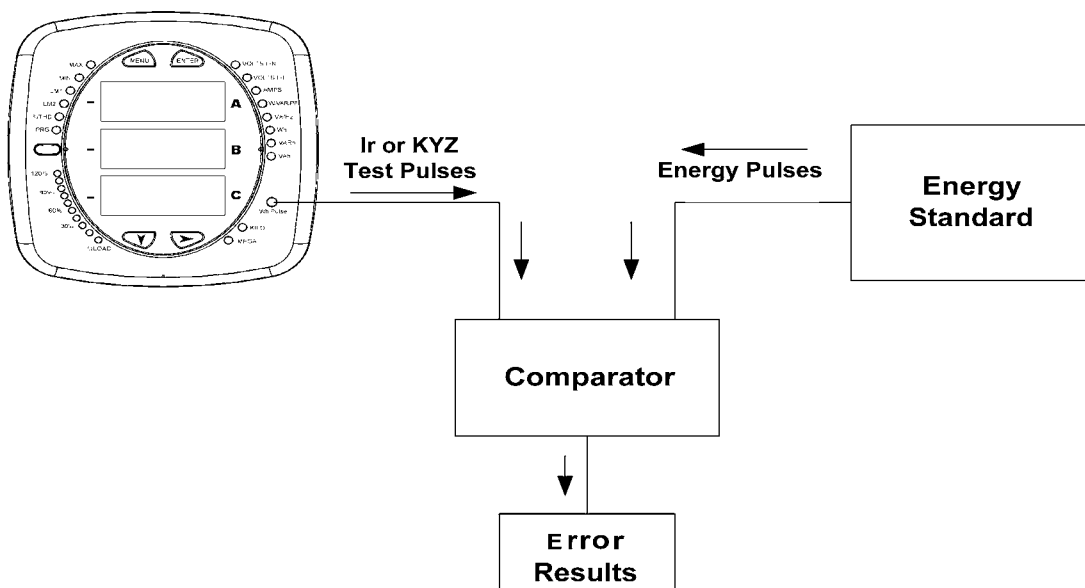


Figure 6.5: Using the Watt-Hour Test Pulse

Table 6.1: Infrared & KYZ Pulse Constants for Accuracy Testing - Kh Watthour per pulse

Input Voltage Level	Class 10 Models	Class 2 Models
Below 150V	0.500017776	0.1000035555
Above 150V	2.000071103	0.400014221

NOTE: Minimum pulse width is 90 milliseconds.

7 Using the I/O Option Cards

Overview

The IQ 250/260 offers extensive **I/O expandability**. Using the two universal Option Card slots, the unit can be easily configured to accept new I/O Option cards even after installation, without your needing to remove it from the installation. The IQ 250/260 auto-detects any installed Option cards. Up to 2 modules of any type outlined in this chapter can be used per meter.

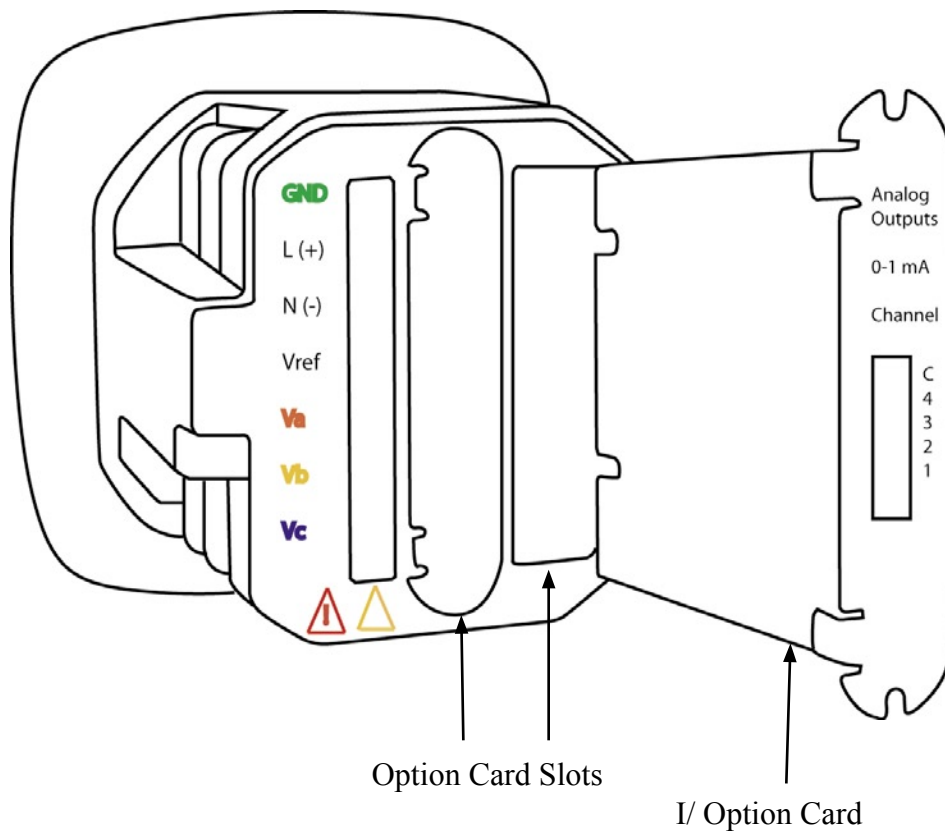


Figure 7.1: IQ 250/260 Back Showing Option Card Slots and I/O Card

Installing Option Cards

The Option Cards are inserted in one of the two Option Card slots in the back of the IQ 250/260.

Note: Remove Voltage Inputs and power supply terminal to the IQ 250/260 before performing card installation.

1. Remove the screws at the top and the bottom of the Option Card slot covers.
2. There is a plastic “track” on the top and the bottom of the slot. The Option card fits into this track.

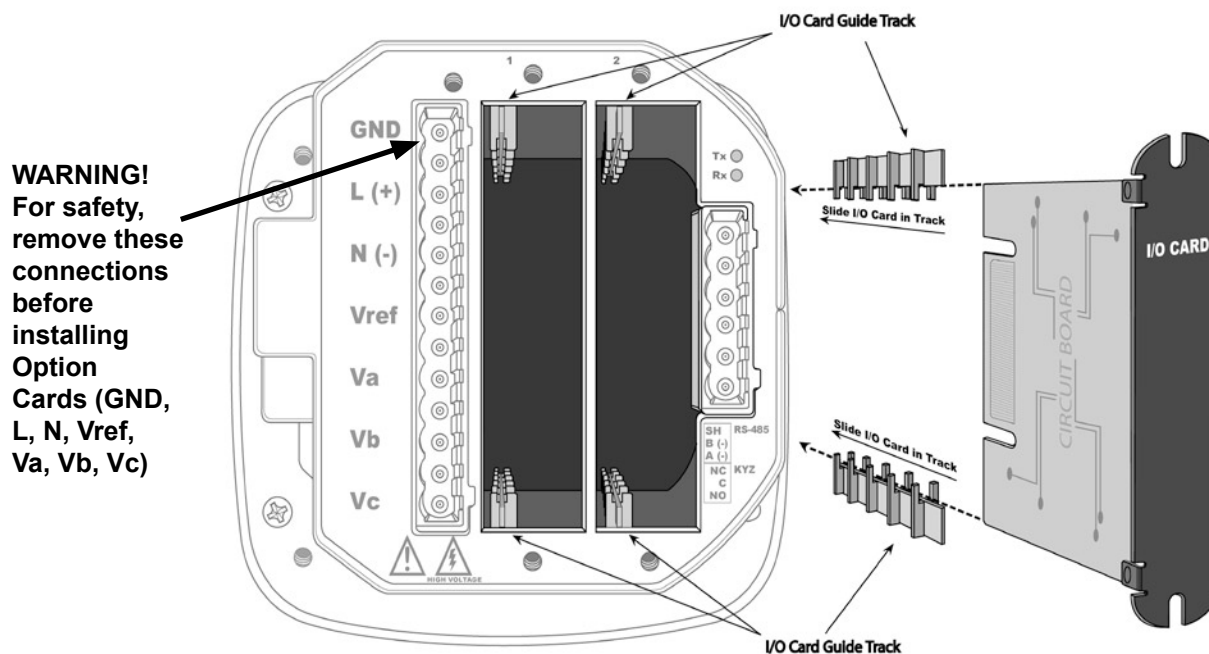


Figure 7.2: Detail of Guide Tracks

3. Slide the card inside the plastic track and insert it into the slot. You will hear a click when the card is fully inserted. **Be careful**, it is easy to miss the guide track.

CAUTIONS!

- Make sure the I/O card is inserted properly into the track to avoid damaging the card's components.
- For proper fit of cards, and to avoid damaging the unit, insert components in the following order:
 1. Option Card 1
 2. Option Card 2
 3. Detachable terminal block 1
 4. Detachable terminal block 2
 5. Communication connection for RS485 Port

Configuring Option Cards

CAUTION! FOR PROPER OPERATION, RESET ALL PARAMETERS IN THE UNIT AFTER HARDWARE MODIFICATION.



The IQ 250/260 auto-detects any Option cards installed in it. You configure the Option cards through software. Refer to Chapter 8 for instructions.

The following sections describe the available Option cards.

Digital Output (Relay Contact) / Digital Input Card (IQ250/260-IO1)

The Digital Output/Input card is a combination of relay contact outputs for load switching and dry/wet contact sensing digital inputs. The outputs are electrically isolated from the inputs and from the main unit.

Specifications

The technical specifications at 25 °C are as follows:

Power consumption:	0.320W internal
Relay outputs.	
Number of outputs:	2
Contact type:	Changeover (SPDT)
Relay type:	Mechanically latching
Switching voltage:	AC 250V / DC 30V
Switching power:	1250VA / 150W
Switching current:	5A
Switching rate max.:	10/s
Mechanical life:	5×10^7 switching operations
Electrical life:	10^5 switching operations at rated current
Breakdown voltage:	AC 1000V between open contacts
Isolation:	AC 3000V / 5000V surge system to contacts
Reset/Power down state:	No change - last state is retained
Inputs.	
Number of Inputs:	2
Sensing type:	Wet or dry contact status detection
Wetting voltage:	DC 12V, internally generated
Input current:	2.5mA – constant current regulated
Minimum input voltage:	0V (input shorted to common)
Maximum input voltage:	DC 150V (diode protected against polarity reversal)
Filtering:	De-bouncing with 50ms delay time
Detection scan rate:	100ms
Isolation:	AC 2500V system to inputs

The general specifications are as follows:

Operating temperature:	(-20 to +70) °C
Storage temperature:	(-40 to +80) °C
Relative air humidity:	Maximum 95%, non-condensing
EMC - Immunity Interference:	EN61000-4-2
Weight:	1.5oz
Dimensions (inch) W x H x L:	0.72 x 2.68 x 3.26
External Connection:	AWG 12-26/(0.129 - 3.31)mm ²
	9 pin, 0.200" pluggable terminal block

Wiring Diagram

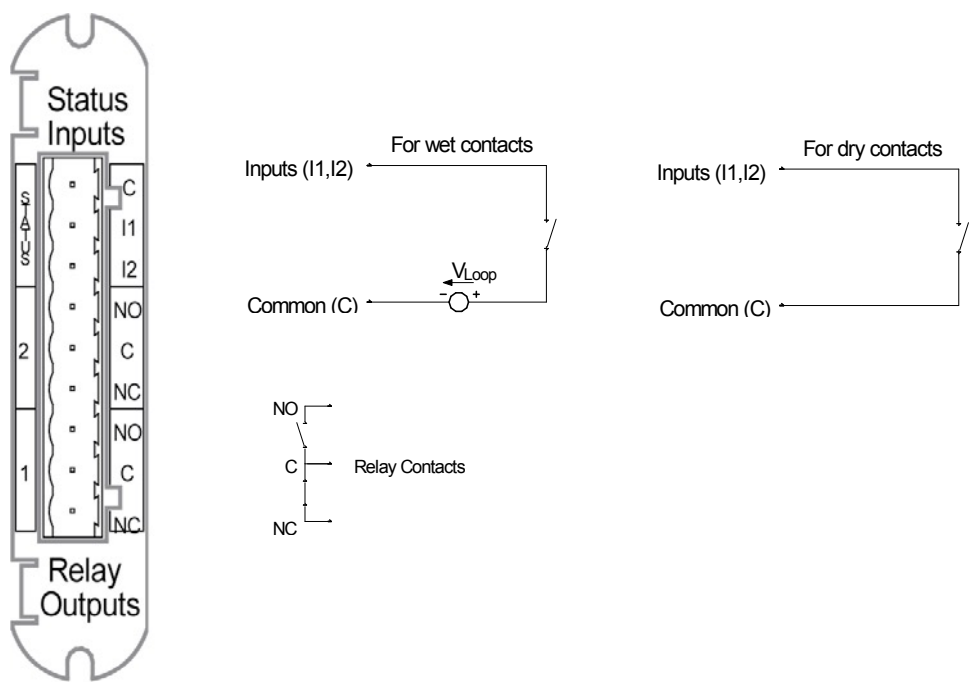


Fig. 7.3: Relay Contact (2) / Status Input (2) Card

Pulse Output (Solid State Relay Contacts) / Digital Input Card (IQ250/260-IO2)

The Pulse Output/Digital Input card is a combination of pulse outputs via solid state contacts and dry/wet contact sensing digital inputs. The outputs are electrically isolated from the inputs and from the main unit.

Specifications

The technical specifications at 25 °C are as follows:

Power consumption:	0.420W internal
Relay outputs	
Number of outputs:	4
Contact type:	Closing (SPST - NO)
Relay type:	Solid state
Peak switching voltage:	DC $\pm$ 350V
Continuous load current:	120mA
Peak load current:	350mA for 10ms
On resistance, max.:	35 Ω
Leakage current:	1 μ A@350V
Switching Rate max.:	10/s
Isolation:	AC 3750V system to contacts
Reset/Power down state:	Open contacts
Inputs	
Number of inputs:	4
Sensing type:	Wet or dry contact status detection
Wetting voltage:	DC 12V, internally generated
Input current:	2.5mA – constant current regulated
Minimum input voltage:	0V (input shorted to common)
Maximum input voltage:	DC 150V (diode protected against polarity reversal)
Filtering:	De-bouncing with 50ms delay time
Detection scan rate:	100ms
Isolation:	AC 2500V system to inputs

The general specifications are as follows:

Operating Temperature:	(-20 to +70) °C
Storage Temperature:	(-40 to +80) °C
Relative air humidity:	Maximum 95%, non-condensing
EMC - Immunity Interference:	EN61000-4-2
Weight:	1.3oz
Dimensions (inch) W x H x L:	0.72 x 2.68 x 3.26
External Connection:	AWG 12-26/(0.129 - 3.31)mm ² 13 pin, 3.5mm pluggable terminal block

Default Configuration:

The IQ 250/260 automatically recognizes the installed option card during Power Up. If you have not programmed a configuration for the card, the unit will default to the following outputs:

Status Inputs	Defaulted to Status Detect
Pulse Outputs	Defaulted to Energy Pulses
Pulse Channel 1	1.8 +Watt-hrs per pulse
Pulse Channel 2	1.8 -Watt-hrs per pulse
Pulse Channel 3	1.8 +VAR-hrs per pulse
Pulse Channel 4	1.8 -VAR-hrs per pulse

Wiring Diagram

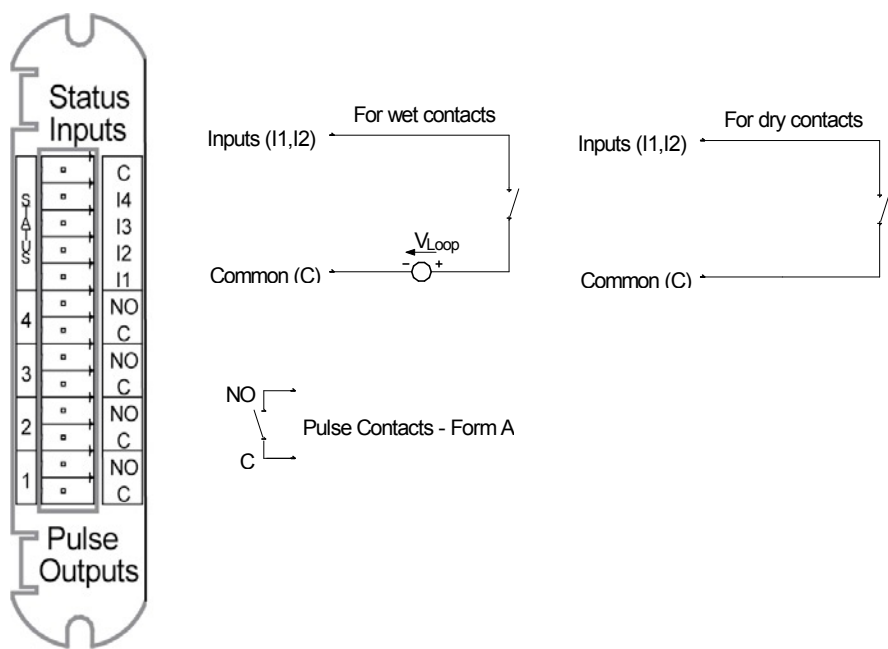


Fig. 7.4: Pulse Output (4) / Status Input (4) Card

1mA Output Card (IQ250/260-IO3)

The 1mA card transmits a standardized bi-directional 0-1mA signal. This signal is linearly proportional to real-time quantities measured by the IQ 250/260 meter. The outputs are electrically isolated from the main unit.

Specifications:

The technical specifications at 25° C at 5kΩ load are as follows:

Number of outputs:	4 single ended
Power consumption:	1.2W internal
Signal output range:	(-1.2 to +1.2)mA
Max. load impedance:	10kΩ
Hardware resolution:	12 bits
Effective resolution:	14 bits with 2.5kHz PWM
Update rate per channel:	100ms
Output accuracy:	± 0.1 % of output range (2.4mA)
Load regulation	± 0.06 % of output range (2.4mA) load step of 5kΩ @ ± 1mA
Temperature coefficient	± 30nA/°C
Isolation:	AC 2500V system to outputs
Reset/Default output value:	0mA

The general specifications are as follows:

Operating temperature:	(-20 to +70) °C
Storage temperature:	(-40 to +80) °C
Relative air humidity:	Maximum 95%, non-condensing
EMC - Immunity Interference:	EN61000-4-2
Weight:	1.6oz
Dimensions (inch) W x H x L:	0.72 x 2.68 x 3.26
External connection:	AWG 12-26/(0.29 - 3.31) mm ² 5 pin, 0.200" pluggable terminal block

Default Configuration:

The IQ 250/260 automatically recognizes the installed option card during Power Up. If you have not programmed a configuration for the card, the unit will default to the following outputs:

Channel 1 +Watts, +1800 Watts => +1mA
-Watts, - 1800 Watts => -1mA

Channel 2 +VARs, +1800 VARs => +1mA
- VARs, -1800 VARs => -1mA

Channel 3 Phase A Voltage WYE, 300 Volts => +1mA
Phase A Voltage Delta, 600 Volts => +1mA

Channel 4 Phase A Current, 10 Amps => +1mA

Wiring Diagram

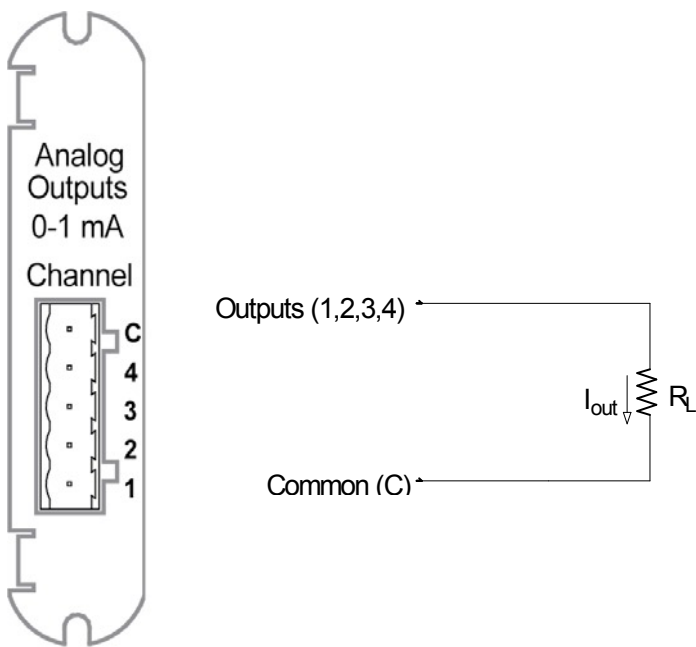


Fig 7.5: 4-Channel 0 - 1mA Output Card

20mA Output Card (IQ250/260-IO4)

The 20mA card transmits a standardized 0-20 mA signal. This signal is linearly proportional to real-time quantities measured by the IQ 250/260. **The current sources need to be loop powered.** The outputs are electrically isolated from the main unit.

Specifications

The technical specifications at 25° C at 500Ω load are as follows:

Number of outputs:	4 single ended
Power consumption:	1W internal
Signal output range:	(0 to 24)mA
Max. load impedance:	850 Ω @ 24VDC
Hardware resolution:	12 bits
Effective resolution:	14 bits with 2.5kHz PWM
Update rate per channel:	100ms
Output accuracy:	± 0.1 % of output range (24mA)
Load regulation:	± 0.03 % of output range (24mA) load step of 200Ω @ 20mA
Temperature coefficient	± 300n A/°C
Isolation:	AC 2500V system to outputs
Maximum loop voltage:	28Vdc max
Internal voltage drop:	3.4VDC @ 24mA
Reset/Default output value:	12mA

The general specifications are as follows:

Operating temperature:	(-20 to +70) °C
Storage temperature:	(-40 to +80) °C
Relative air humidity:	Maximum 95%, non-condensing
EMC - Immunity interference:	EN61000-4-2
Weight:	1.6oz
Dimensions (inch) W x H x L:	0.72 x 2.68 x 3.26
External connection:	AWG 12-26/(0.129 - 3.31)mm ² 5 pin, 0.200" pluggable terminal block

Default Configuration:

The IQ 250/260 automatically recognizes the installed option card during Power Up. If you have not programmed a configuration for the card, the unit will default to the following outputs:

Channel 1+Watts, +1800 Watts => 20mA
 -Watts, -1800 Watts => 4mA
 0 Watts => 12mA

Channel 2+VARs, +1800 VARs => 20mA
 - VARs, -1800 VARs => 4mA
 0 VARs => 12mA

Channel 3Phase A Voltage WYE, 300 Volts => 20mA
 0 Volts => 4 mA
 Phase A Voltage Delta, 600 Volts => 20mA

Channel 4Phase A Current, 10 Amps => 20mA
 0 Phase A Current, 0 Amps => 4 mA

Wiring Diagram

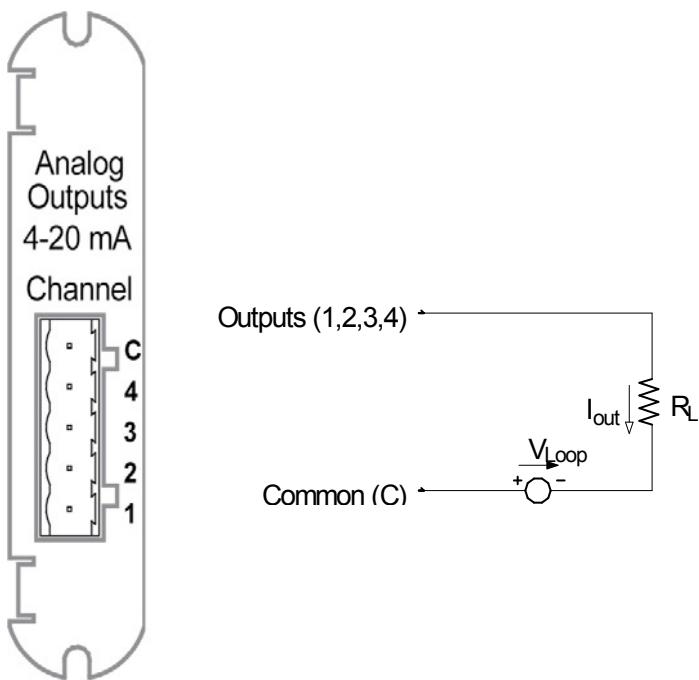


Fig. 7.6: 4-Channel 4 - 20mA Output Card

8 Programming the IQ 250/260

Overview

The IQ 250/260 Meter can be configured using either the meter Face Buttons (Menu, Enter, Down and Right) or IQ 250/260 Configuration Software. To connect to the meter for software configuration, use the RS485 port (Com 2) on the back panel of the meter.

The 250/260T must be configured with the IQ 250/260 Configuration Software, using the RS485 port, since it does not have a front panel.

This chapter contains instructions for programming the IQ 250/260 Meter and Transducer using the IQ 250/260 Configuration Software.

Connecting to the IQ 250/260

1. Open IQ 250/260 Configuration Software.
2. Click the **Connect** icon on the Title bar or **Connection>Quick Connect**.
3. **If you are connecting to the IQ 250/260 through your PC:**
 - a. Make sure the **Serial Port** radio button is selected.
 - b. Enter **Device Address** (1-249).
 - c. Select **Baud Rate** from the pull-down menu.
 - d. Select the port you are using from the pull-down menu. The **Available Ports/All Ports** radio buttons determine which port selections the menu displays.
 - e. Select **Modbus RTU** from the **Protocol** pull-down menu.
 - f. Select **Flow Control: None** or **Hardware**.
 - g. Select **Echo Mode: No Echo** or **Statis Echo**.



If you are connecting to the Meter through the Power Xpert® Gateway:

- a. Make sure the **Network** radio button is selected.
 - b. Enter **Device Address** (1-247).
 - c. Enter the Gateway's **IP Address**.
 - d. Enter **Network Port**.
 - e. **Protocol** defaults to **Modbus TCP**.
4. Click the **Connect** button. You will see the **Device Status** screen, shown on the right.

NOTE for IQ 250/260 Transducer:

When the **IQ 250/260T** is powered up, for **10 seconds** you can connect to the meter using the Factory Initial Default Settings (even if the Device Profile has been changed). After 10 seconds, the Device Profile reverts to the actual Device Profile in use.

Factory Initial Default Settings

Baud Rate: 9600
Port: COM1
Protocol: Modbus RTU

Device	Device Type	Serial Number
IQ 260	IQ260	0020061514

Item	Value
Boot	G
Run	bC
State	Run Mode
Model Type	IQ 260
On Time	Tuesday, May 01, 2007 14:04:38
ASIC	2

Polling IQ 260 [OK]

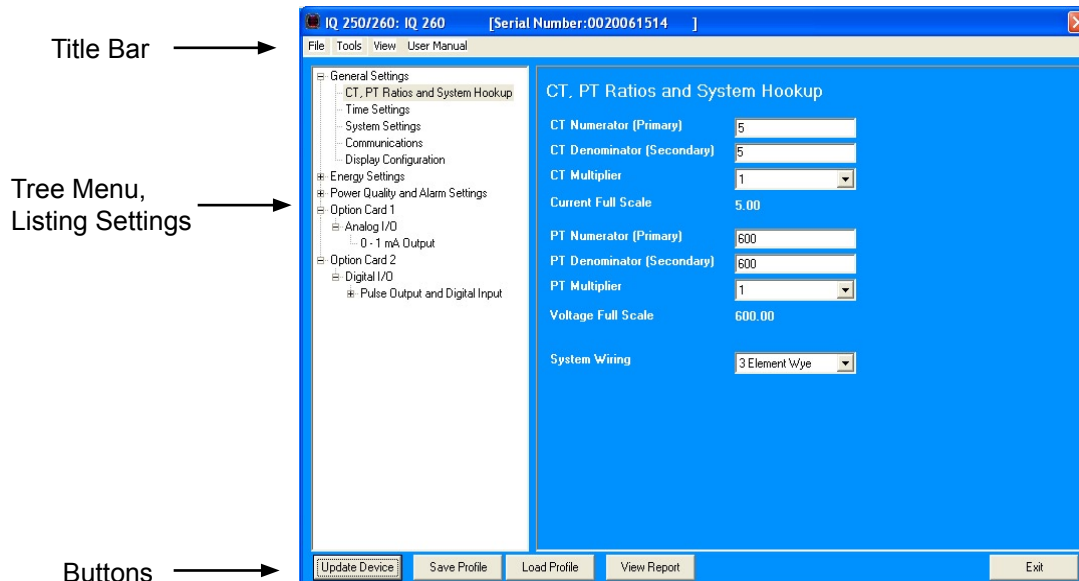
Accessing the IQ 250/260 Device Profile

1. Click the **Profile** icon in the Title Bar.

You will see the **IQ 250/260 Device Profile** screen. The Menu on the left side of the screen allows you to navigate between settings screens (see below).



The **Device Profile** screen features a **Tree Menu** for Settings navigation, and **Buttons** and a **Title Bar** that allow you to perform tasks, for example, updating the Device Profile.



IMPORTANT! Modification to the Device Profile may cause improper Option Card operation due to changed Scaling, etc. Verify or update Programmable Settings related to any Option Cards installed in the meter.

Selecting Settings

- The **Tree Menu** on the left side of the screen allows you to navigate between Settings. The example screen pictured above shows the Tree Menu you will see when you first open the screen. Click on the + next to a Setting (for example, Power Quality and Alarms Settings) to see additional Setting options.
- From the **Tree Menu**, click on the **Setting** you want to configure (for example, Energy Settings) to display its screen in the right side of the **Device Profile** screen.

NOTE: The **Tree Menu** you see may look different from that shown in the example screen, because the **Option Card** sections of the menu depend on the connected meter's configuration. That is, if you have Option cards in your meter, the Settings for those particular Option cards appear in the Tree Menu. In addition, the example screen is for an IQ 260 Meter. The Tree Menu for an IQ 250 Meter does not have **Power Quality and Alarm Settings**.

Performing Tasks

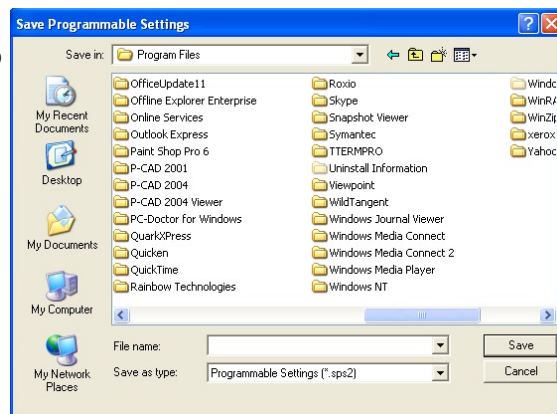
You can perform tasks from either the **Device Profile** screen **Buttons** or from the **Title Bar**.

■ The screen **Buttons** and their functions are as follows:

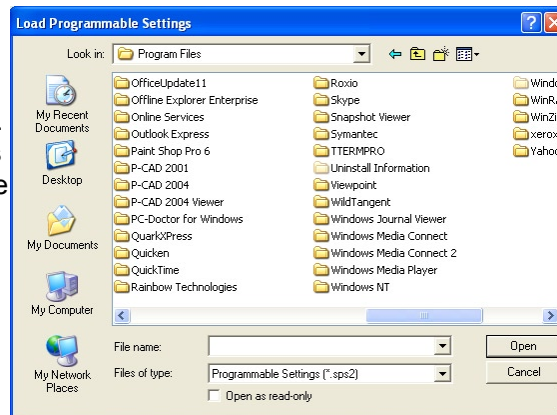
- ◆ **Update Device:** Click to send the current settings to the meter.

NOTE: You must click the Update Device button after making changes to the Settings screens, if you want to update the connected meter's settings.

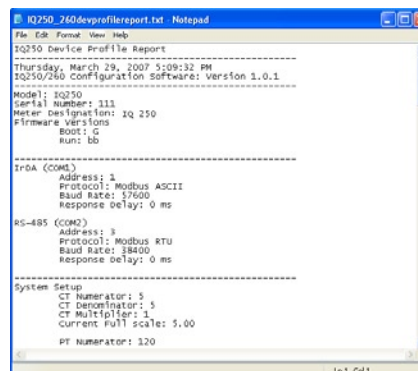
- ◆ **Save Profile:** Click to save the **Device Profile** settings to a file. You will see the **Save Programmable Settings** window, shown on the right. Give a name to the Device Profile and click **Save**.



- ◆ **Load Profile:** Click to load a previously saved Device Profile Settings file. You will see the **Load Programmable Settings** window, shown on the right. Select the saved Device Profile you want and click **Open**. The settings from that file will now appear in the **Settings** screens; **for example**, the CT and PT Ratios will be those from the saved Device Profile, rather than from the currently connected meter.



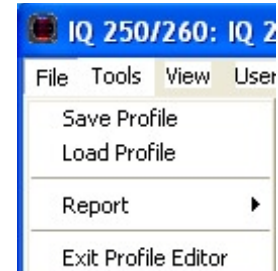
- ◆ **View Report:** Click to open a **Notepad** window containing the Device Profile settings in a text file. See the example window, shown on the right.
 - **Print** the text file by selecting **File>Print** from the **Notepad Title Bar**.
 - **Save** the text file by selecting **File>Save** from the **Notepad Title Bar**.



- ◆ **Exit:** Click to leave the **Device Profile Editor**.

- Three items in the **Title Bar** - **File**, **Tools**, and **View** - open menus that allow you to perform functions. These menus and functions are described below.
When you click **User Manual** from the **Title Bar** a pdf file of this manual opens, with instructions for whichever **Device Profile Setting** is active at the current time. For example, if you are on the **Display Configuration** screen and you click **User Manual**, the instructions for setting display configuration are shown.

- ♦ Click **File** from the **Title Bar** to see the menu shown on the right.
The **File** menu allows you to perform functions that can also be performed using the screen **Buttons**, described on the previous page: **Save Profile**, **Load Profile**, **Report**, and **Exit Profile Editor**.



- ♦ Click **Tools** from the **Title Bar** to see the menu shown on the right.
The **Tools** menu allows you to:

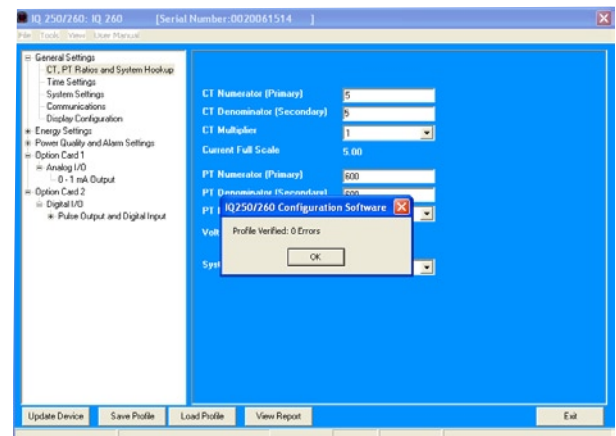
 - o **Update Device**: Functions the same as the **Update Device** button. See previous page for instructions and Note.



- o **Verify Profile**: Click to perform a verification of the current Device Profile settings. You will see a window like the one shown below, on the right.

NOTE: If there are any errors, the number of errors and type are listed in the window. Click **View>Output Logs>Errors** to see more information about any errors (refer to the **View** menu section on the next page for additional information).

- o **Load from Device**: Click to load the Settings fields with values from the currently connected meter.



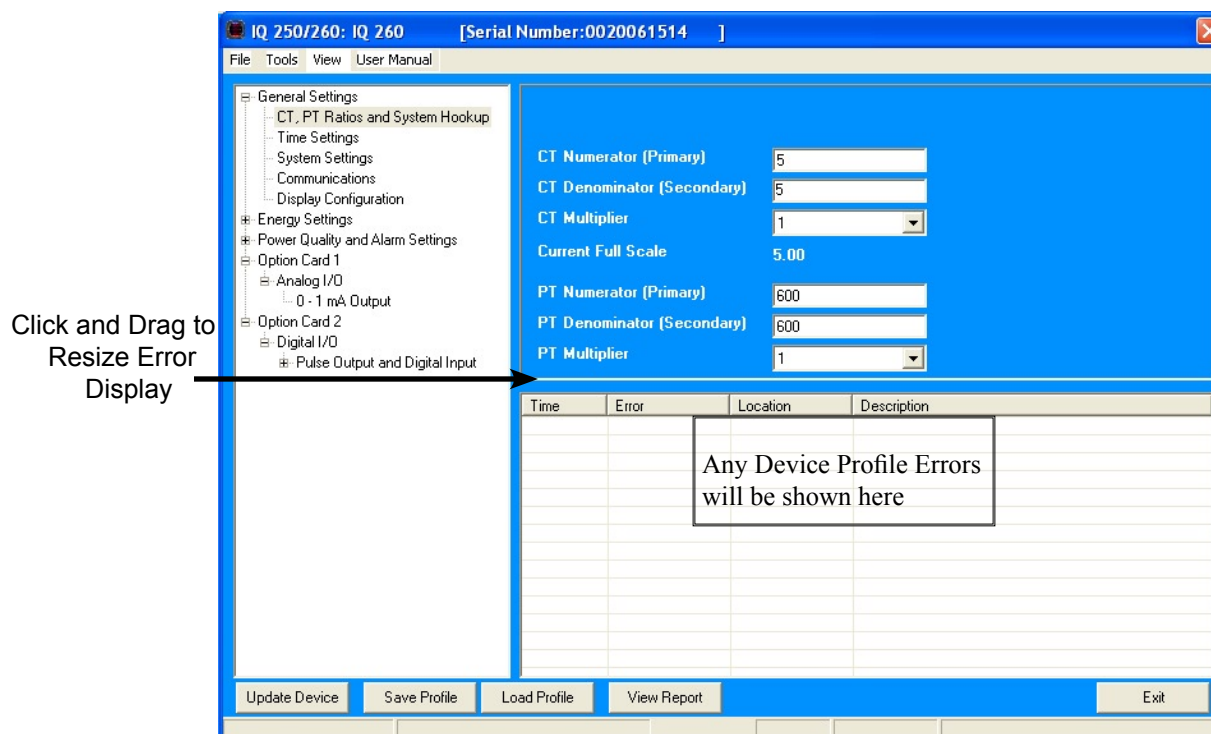
IMPORTANT! If you have made changes to the settings and have not saved them to a file or updated the device, the changes are lost.

- ◆ Click **View** from the **Title Bar** to see the menu shown on the right. The **View** menu allows you to:
 - **View Output Logs/Errors:** View the Errors Log.
 - **View Last Update Information:** View Update information for this Device Profile.



NOTE: The instructions for these two functions follow.

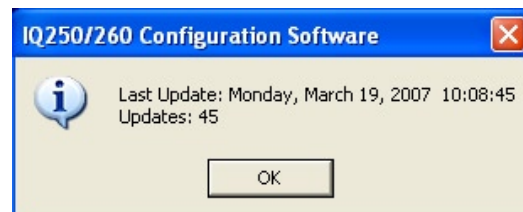
Viewing Errors Output Log: Click **Output Logs>Errors** from the **View** menu to open a display on the bottom of the screen, detailing any errors, the time they occurred, the location of the error, and a description of the error. See the screen example below.



You can **resize** the display by clicking and dragging on the line above the **Errors** display. Click **View Output Log>Errors** a second time to remove the Errors display from the screen.

Viewing Last Update Information: click **Last Update Information** from the **View** menu to open a window displaying the time and date of the last update, and the total number of updates, for this Device Profile.

Click **OK** to close the window.



Configuring Settings

The following sections contain detailed instructions for configuring the **Device Profile** settings. All of the settings are reached from the **Tree Menu** of the **Device Profile** screen.

Configuring CT, PT Ratios and System Hookup

Use this setting to configure **Current Transformer** and **Potential Transformer** ratios and to select the **System Hookup**.

❖ Functional Overview of CT and PT Ratios:

Current and **Potential Transformers** are used mainly for the following reasons:

- To insulate, and as a result isolate, the meter from high-voltage circuits
- To change the primary voltage and current to standard values and sizes that the meter can measure.

The CT and PT transformers deliver fractions of the primary voltage and current to the meter. With properly set ratios and multipliers, the readings of the meter can be used to determine the energy, voltage, current, or power of the system.

From the **Tree Menu**, click **General Settings>CT, PT, Ratios and System Hookup**.

The screen **fields** and acceptable **entries** are as follows:

CT Ratios

CT Numerator (Primary): **1 - 9999**

CT Denominator (Secondary): **5 or 1 Amp**

NOTE: This field is display only.

CT Multiplier (Scaling): **1, 10 or 100**

Current Full Scale: **Display only**.

PT Ratios

PT Numerator (Primary): **1 - 9999**

PT Denominator (Secondary): **40 - 600**

PT Multiplier (Scaling): **1, 10, 100, or 1000**

Voltage Full Scale: **Display only**.

System Wiring

3 Element Wye; 2.5 Element Wye; 2 CT Delta

Example Settings:

For a **CT** of **2000/5A**, set the following **CT Ratios** in the entry fields:

CT Numerator (Primary) **2000**

CT Denominator (Secondary) **5**

CT Multiplier **1**

The **Current Full Scale** field will read **2000**.

NOTE: You can obtain the same **Current Full Scale** by entering a CT Numerator of 200 and a CT Multiplier of 10.

The screenshot shows the 'IQ 250/260' software window with the serial number '0020061514'. The 'Tree Menu' on the left has 'CT, PT Ratios and System Hookup' selected. The main area displays the following settings:

CT, PT Ratios and System Hookup	
CT Numerator (Primary)	5
CT Denominator (Secondary)	5
CT Multiplier	1
Current Full Scale	5.00
PT Numerator (Primary)	600
PT Denominator (Secondary)	600
PT Multiplier	1
Voltage Full Scale	600.00
System Wiring	3 Element Wye

At the bottom of the window are buttons for 'Update Device', 'Save Profile', 'Load Profile', 'View Report', and 'Exit'.

For a system that has **14400V** primary with a **120V** secondary line to neutral (PT Ratio of 120:1), set the following **PT Ratios** in the entry fields:

PT Numerator (Primary) **1440**

PT Denominator (Secondary) **120**

PT Multiplier **10**

The **Voltage Full Scale** field will read **14400**.

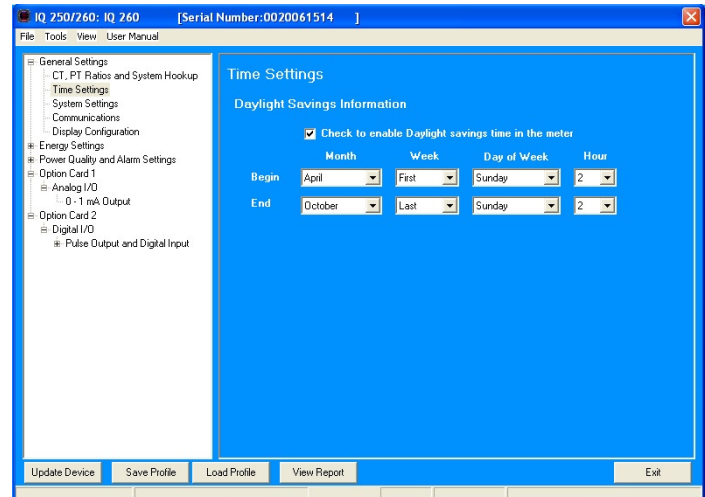
Configuring Time Settings

Use this setting to **enable** or **disable Daylight Savings Time** for the IQ 250/260, and to set the beginning and ending times for Daylight Savings Time. From the **Tree Menu**, click **General Settings>Time Settings**.

Check or uncheck the box to **Enable** or **Disable Daylight Savings time**.

Use the **entry fields** to set the **start** and **end** times for the **Daylight Savings Time** feature, if enabled. Select the values you want from the Month, Week, Day of the Week, and Hour fields.

NOTE: The **Hour** field uses a **24-Hour clock**.



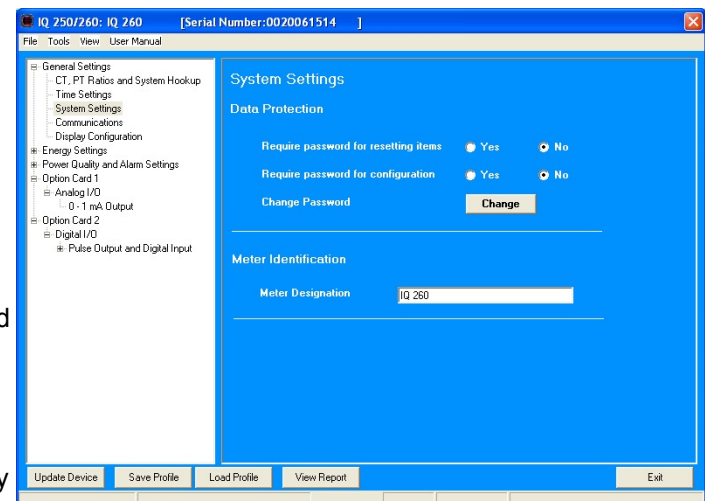
Configuring System Settings

From the **Tree Menu**, click **General Settings>System Settings**.

From this screen, you can do the following:

- **Enable** or **Disable Password** for **Resetting** and/or **Configuration**: click the **radio button** next to **Yes** or **No**. **Enabling Password protection** prevents unauthorized tampering with devices.

IMPORTANT! You must set up a password before enabling Password Protection. Click the **Change** button next to **Change Password** if you have not already set up a password.



- **Change the Password**: click the **Change** button.
- **Change the Device Designation**: input a new designation into this field.

When you click the **Change** button next to **Change Password** in the **Settings** screen, you will see the **Enter the New Password** screen.

1. Type in the new password (0 - 9999).
2. Retype the password.
3. Click **Change**. The new password will be saved and the meter will restart.

NOTE: If **Password Protection** has already been **enabled** for **configuration** and you attempt to change the password, you will see the **Enter Password** screen (shown below) after you click Change. Enter the old password and click **OK** to proceed with the password change.

You can enable or disable a Password for Resetting (Reset Max/Min Energy Settings, Energy Accumulators, and the Individual Logs) and Configuration (Device Profile) in the Systems Settings screen (see previous page).

NOTE: If you enable a Password for Resetting, you must also enable it for Configuration.

IMPORTANT! You must set up a password before enabling Password Protection. Click the Change button next to Change Password if you have not already set up a password and follow the above instructions.

When anyone attempts to make a change that is under **Password protection**, the **Enter Password** screen opens. (See the example screen on the right.) If the correct Password is not entered, the change will not take place.

Configuring Communications Settings

Use this screen to enter **communication settings** for the meter's **RS485 Port (Com 2)**.

NOTES:

- The settings on this screen are the **current settings** for **communication**.
- **Any changes may affect communication between the meter and your PC.**

From the **Tree Menu**, click
General Settings>Communications.

The screen fields and acceptable entries are as follows:

COM 2 (RS-485)

Address: **1 - 247**

Protocol: **Modbus RTU, Modbus ASCII or DNP 3.0**

NOTE: Response Delay is the delay the meter should use before responding to queries. If your connecting device requires a delay before receiving information, use response delay to program the time to wait before the meter starts responding to queries.

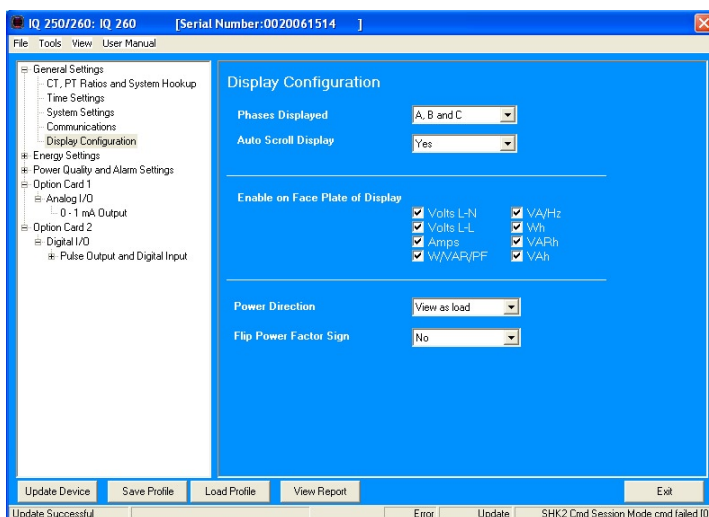
Setting Display Configuration

Use this screen to set the **display** of the meter's **faceplate**. Refer to Chapter 6 of this manual for additional information and instructions on using the faceplate.

From the **Tree Menu**, click **General Settings>Display Configuration**.

The screen fields and acceptable entries are as follows:

- Phases Displayed: **A**; **A and B**; **A, B, and C**. This field determines which phases display on the faceplate. **For example**, if you select A and B, only those two phases will be displayed on the faceplate.
- Auto Scroll Display: **Yes** or **No**. This field **enables** or **disables** the **scrolling** of selected readings on the faceplate. If **enabled**, the readings scroll every **5 seconds**.
- Enable on Face Plate of Display: Check the **boxes** of the **Readings** you want displayed on the faceplate of the meter. **You must select at least one reading**.
- Power Direction: **View as Load** or **View as Generator**
- Flip Power Factor Sign: **Yes** or **No**.



Configuring Energy, Power Scaling, and Averaging

Use this setting to configure:

- The display of Power in the meter
- The display and storage of Energy in the meter
- The interval over which Average values are computed.

❖ Functional Overview of Energy Settings and Averaging:

■ Energy Scaling

Energy Setting includes:

- **Digits** (the number of digits in the reading)
- **Decimals** (the number of decimal places in the reading)
- **Energy Scale**: the scale of the reading – unit; kilo (number times 1000); Mega (number times 1 million).

Energy settings allow you to balance the resolution (or accuracy) of the energy stored, with the interval over which energy rollover occurs. **For example**, the maximum resolution for a k scale reading is: 99999.999k.

To calculate the speed at which the energy will rollover, you must know the **Energy Full Scale**, which is computed from the CT and PT Full Scale values (see Section 9.2.4.1). The **formula** for calculating **Energy Full Scale** is:

Wye system: $CT\ Full\ Scale \times PT\ Full\ Scale \times 3$

Delta system: $CT\ Full\ Scale \times PT\ Full\ Scale \times 3 \times \sqrt{3}$

For example, for a CT Full Scale of 2000, PT Full Scale of 14400, Wye system:

$$2000 \times 14400 \times 3 = 86400000$$

In this example, the energy will increment at 86400000 Watts per hour, or 24000 Watts per second.

This value allows you to determine the number of digits, decimal places, and energy scale you want to configure for the Energy settings, when you take into account the rollover time. To determine the number of hours before rollover, use this **formula**:

$[Max\ Resolution]/[Full\ Scale] = \#Hours$, where Max Resolution = maximum digits and decimals for the Energy scale in use.

Using the **example** from above, with an energy scale of Mega, the formula would be:

$$99999.999\ M / 86.4\ M = 1157.4074\ \text{hours or about 48 days until rollover.}$$

NOTE: To increase the number of days until rollover, you can:

- Increase the number of digits (to 8)
- Decrease the number of decimal places (to 0)
- Increase the Energy Scale (to M).

■ Demand Averaging

Demand is the average rate of energy use over time. The IQ 250/260 supports two types of demand averaging: **Fixed demand** and **Sliding demand**:

- **Fixed demand** records the average demand for time intervals that you define (usually **5**, **15** or **30** minutes).
- **Sliding demand** functions like multiple, overlapping Fixed demand. You define the subintervals at which an average of demand is calculated. **An example** of Sliding demand would be a **15-minute Demand block** using **5-minute subintervals**, thus providing a new demand reading every 5 minutes, based on the last 15 minutes.

From the **Tree Menu**, click **Energy Settings> Energy, Power Scaling, and Averaging**.

The screen fields and acceptable entries are as follows:

- **Energy Settings**

Energy Digits: **5; 6; 7; 8**

Energy Decimal Places: **0 - 6**

Energy Scale: **unit; kilo (K); Mega (M)**

For example: a reading for Digits: 8; Decimals: 3;

Scale: K would be formatted: **00123.456k**

NOTES:

- ❖ Your selection in the **Energy Settings** fields determines the **precision** of energy stored for **display** and **polling**. Refer to the **Functional Overview** at the beginning of this section for more information.
- ❖ If you are **changing** the **energy settings**, we recommend you first **reset** the **Energy Accumulators**, in order to prevent erroneous counts. See instructions for resetting the meter's Energy Accumulators, later in this chapter.

- **Power Settings:**

Power Scale: **Auto; unit; kilo (K); Mega (M)**

- **Demand Averaging:**

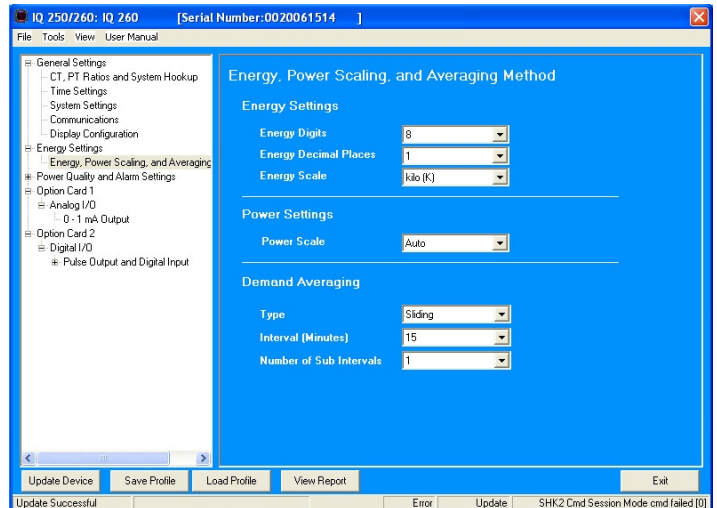
Type: **Fixed** or **Sliding**

Interval: **5; 15; 30; 60**

Number of Subintervals: **1; 2; 3; 4**

NOTE: You will only see the **Number of Subintervals** field if you select **Sliding Demand**.

NOTE: If you have set an Input to trigger End of Interval (EOI) demand averaging (using either a Relay Output/ Digital Input or a Pulse Output/Digital Input Option card) any entry you make in the Demand Averaging field will be ignored. A message to that effect appears on the screen. See the Relay Card and Pulse Output Card instructions later in this chapter.



Configuring Limits (IQ 260 Only)

Use this screen to assign **Limits** for the meter.

❖ Functional Overview for Limits:

Limits are **transition points** used to divide **acceptable** and **unacceptable** measurements. When a value goes above or below the limit, an **out-of-limit condition** occurs. You can set and configure up to **eight Limits** for the IQ 260 meter.

Once they are configured, you can **view** the **out-of-Limits** (or **Alarm**) **conditions** in the **Limits Polling** screen. You can assign the **eight limits** to readings from **six groups** of parameters:

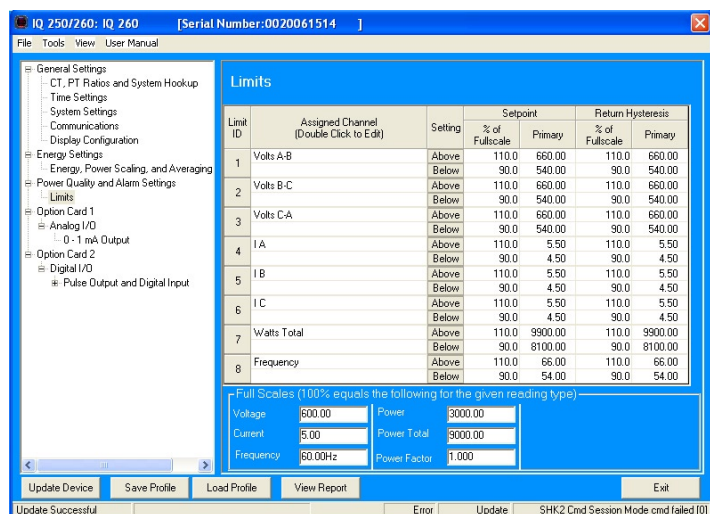
- **Readings** (Instantaneous Voltage; Instantaneous Current; Total and Per Phase Power and Power Factor; Frequency; and Neutral Current)
- **Demand** (Current; Per Phase, Total Power and Power Factor)
- **Maximums** (Maximum values for all of the readings listed above, including (for IQ 260) THD voltage and currents)
- **Minimums** (Minimum values for all of the readings listed above, including (for IQ 260) THD voltage and currents)
- **Phase Angle** (For voltage and current)
- **THD** (For IQ 260, voltage and current)

From the **Tree Menu**, click **Power Quality and Alarm Settings>Limits**.

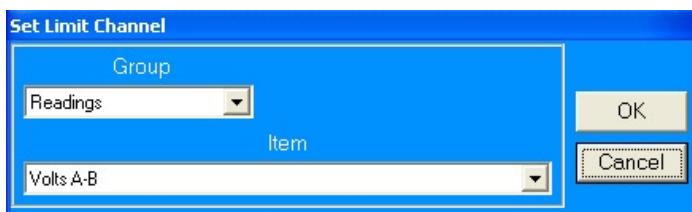
The **current settings** for **Limits** are shown in the screen.

The bottom of the screen shows the **Full Scale** values for:

- Voltage
- Current
- Frequency
- Power
- Power Total
- Power Factor
- THD
- Phase Angles



1. Select a limit by double-clicking on the **Assigned Channel** field.
2. You will see the screen on the right. Select a **Group** and an **Item** for the **Limit**.
3. Click **OK**.



To Configure a Limit:

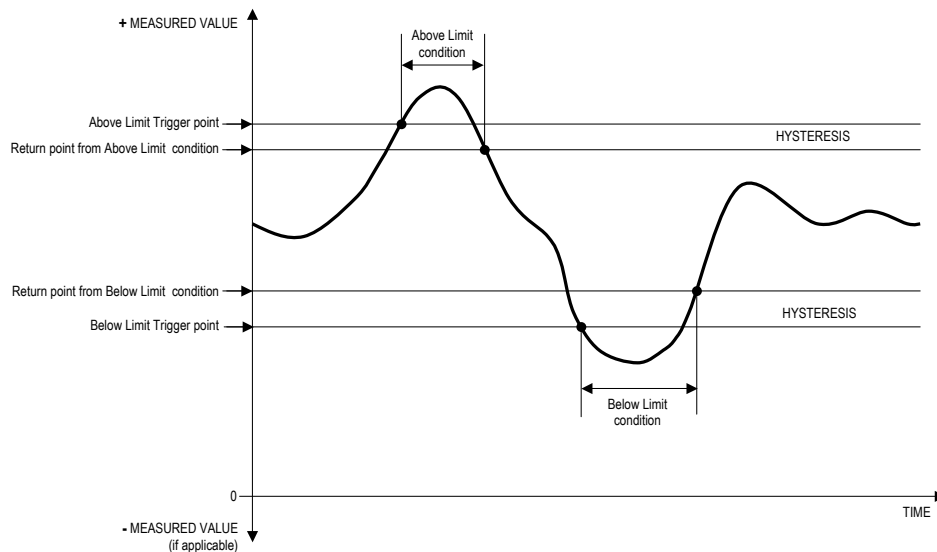
Double-click on the **Field** to set the following values:

Above and Below Set Point: % of Full Scale (the point at which the reading goes out of limit)

Examples: 100% of 120V Full Scale = 120V
90% of 120V Full Scale = 108V

Above and Below Return Hysteresis: (the point at which the reading goes back within limit)

Examples: Above Set Point = 110%	Below Set Point = 90%
(Out of Limit above 132V)	(Out of Limit below 108V)
Above Return Hysteresis = 105%	Below Return Hysteresis = 95%
(Stay Out of Limit until below 126V)	(Stay Out of Limit until above 114V)



The **Primary** fields are **display only**. They show what the set point and return hysteresis value are for each limit.

NOTES:

- If you are entering **negative limits**, be aware that the negative value affects the way the above and below limits function, since negative numbers are processed as **signed values**.
- If the Above Return Hysteresis is greater than the Above Set Point, the Above Limit is Disabled; if the Below Return Hysteresis is less than the Below Set Point, the Below Limit is Disabled. You may want to use this feature to disable either Above or Below Limit conditions for a reading.

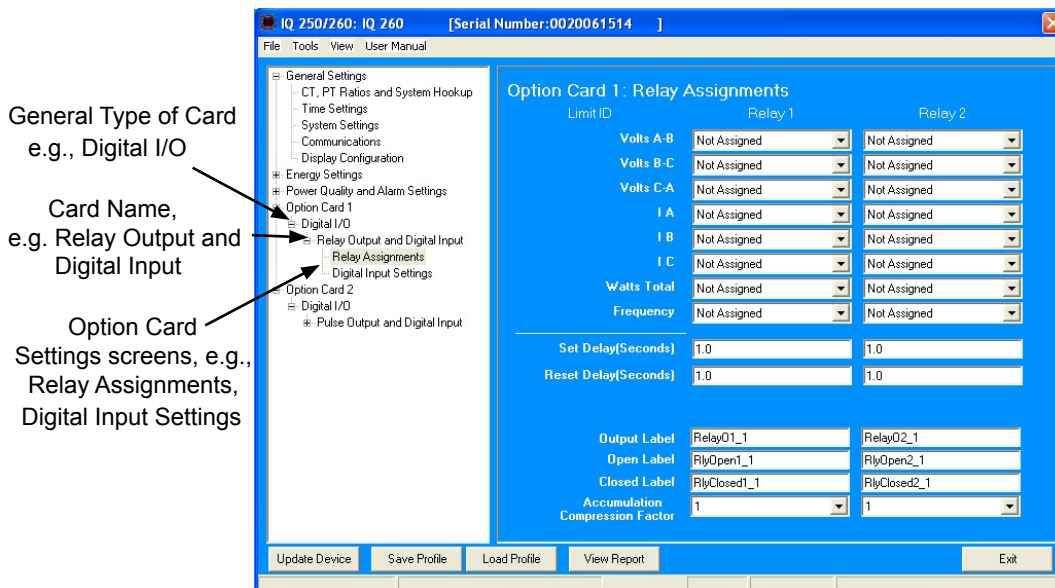
Configuring I/O Option Cards

The IQ 250/260 Meter **automatically detects** the presence of any **Option cards** installed in it. You will see the installed card(s) listed in the **Tree Menu** (see figure below). Up to **two Option cards** can be installed in the meter. Refer to Chapter 7 of this manual for additional information concerning Option cards, including installation procedures.

You must **configure** an **Option card** before using it. The following sections provide you with instructions for configuring each of the available Option cards.

Option Card Screens:

The **type** of **Option card** installed in the meter determines the **settings** you need to configure, and so, the screens you will see. Click on the **selectable lines** under your Option card in the **Tree** menu. See the example below.



Configuring a Relay Output/Digital Input Card (IQ250/260-IO1):

The **Relay Output/Digital Input Option Card** has:

- Two relay contact outputs for load switching
- Two wet/dry contact sensing digital inputs.

Accumulators in the software count the transitions of the Inputs and Outputs.

For technical specifications and hardware installation, refer to Chapter 7 of this manual.

NOTE: When installing a Relay Output/Digital Input card, we recommend you **reset the accumulators** for the card, in order to prevent erroneous counts. See instructions on using the Reset Device Information screen to reset card accumulators, later in this chapter.

An **example** use of the optional Relay Card is in monitoring the status of circuit breakers or relays in your electrical system. The two status inputs could be used to monitor two circuit breakers, and the two relay outputs could be used to sound an alarm upon the occurrence of a programmed out of limit condition (IQ 260, only). Relay outputs on IQ 250/260 can be manually triggered: see the “Performing Manual Relay Control” section, later in this chapter.

Click **Relay Assignments** to set the **limits/alarm conditions** (IQ 260, only) and **labeling and compression options** for the card's **Relay Outputs**. From the **Relay Assignments** screen, you can:

- Configure up to **8 limits** for each of the two Relay Outputs (IQ 260)
- Set a **Delay** and **Reset Delay** for the Outputs (IQ 260)
- Assign each Output an **Output Label**, **Open Label**, and **Closed Label**
- Assign an **Accumulation Compression Factor** for each output

IMPORTANT! First use the Limits screen to set up the limits you want to assign to an Output. See instructions earlier in this chapter.

NOTE: The Limits functionality is only available for the IQ 260. If you are connected to an IQ 250, you will only see the Label and Accumulation Compression Factor fields in this screen.

The screenshot shows the 'Option Card 1: Relay Assignments' window. On the left is a tree view with categories like General Settings, Time Settings, System Settings, Communications, Display Configuration, Energy Settings, Power Quality and Alarm Settings, Option Card 1, Digital I/O, and Option Card 2. The 'Relay Assignments' option under Option Card 1 is selected. The main area shows configuration for Relay 1 and Relay 2. Each relay has a 'Limit ID' column and a 'Relay' column. Below these are rows for various electrical parameters (Volts A-B, Volts B-C, Volts C-A, I A, I B, I C, Watts Total, Frequency) with dropdown menus for each. At the bottom, there are input fields for 'Set Delay(Seconds)', 'Reset Delay(Seconds)', 'Output Label', 'Open Label', 'Closed Label', and 'Accumulation Compression Factor'.

1. The **available Limits** appear in the **Limit ID** column.

To **assign a Limit** to an Output Relay:

Select the **Alarm trigger** from the **pull-down menu** next to the **Limit ID**. The options are:

- **Above Limit** (the Output is triggered when the Above Limit condition occurs)
- **Below Limit** (the Output is triggered when the Below Limit condition occurs).

You can assign the limit to one or both (or neither) of the Relay Outputs.

NOTE: A Relay operates when any one assigned Limit is tripped, and stays in the Set condition as long as one Limit is in the Alarm state.

2. You can enter **Set Delay** and/or **Reset Delay**. These values are the delay before the Output is changed: **Set** is when the common is shorted to **Normal Open** (this is the **Set Condition**).

3. The **current Output Labels** are displayed in the screen. These labels are used for Logging. To **change** the Output labels, click in the Labels field you want to change, and enter a new label. The fields that can be changed are:

- **Output Label** – Label ID
- **Open Label** – Open state ID
- **Closed Label** – Closed state ID

4. You can specify an **Accumulation Compression Factor**. The Compression Factor is used to adjust how high an accumulator will go before rolling over. Because of this, it is useful in **delaying rollover**.

For example, if you select a Compression Factor of 10, each time 10 Pulse/State changes occur, the accumulator count will increment by 1. The **available Compression Factors** are: **1, 10, 100, 1000, 10000, and 100000**. The **default** Compression Factor is **1**.

5. To **configure the Relay Inputs**, click **Digital Input Settings**. Use this screen to set up **Accumulators and Input Labels**.

- You can set up to **two Input IDs** for your Relay Card, and assign a **Label, Open Label, and Closed Label** for each.
- You can assign **labels** and other information for **Accumulators** for the Inputs.

a. Make a selection in the **Assigned to** field.

The **available selections** are:

- Status Only**
- EOI Pulse, Trigger on Contact Closing**
- EOI Pulse, Trigger on Contact Opening**
- EOI Pulse, Trigger on Contact Change**
- Accumulator, Increment on Contact Closing**
- Accumulator, Increment on Contact Opening**
- Accumulator, Increment on Contact Change**

Option Card 1: Digital Input Settings

Input ID	Assigned to	Units/Count	Accumulator	Label
1	Status Only	0.8224	1	RelayAcc1_1
2	Status Only	0.8224	1	RelayAcc2_1

Note: The Compression field is used to adjust how high an accumulator will go before rolling over. If the Compression is set to 1, each time a Pulse/State change occurs, the accumulator count will increment by 1. If the Compression is set to 10, each time 10 Pulses/State changes occur, the accumulator count will increment by 1.

Input Labels

Input	Label	Open Label	Closed Label
1	Relay1_1	Relay1_1	Relay1_1
2	Relay2_1	Relay2_1	Relay2_1

NOTES on End of Interval (EOI):

- EOI is triggered when the selected condition is met.
- EOI is used as a **trigger** for **demand averaging**: when the selected condition is met, the EOI delineates an interval that results in demand averaging being performed.
- The minimum interval between EOI Pulses used to trigger demand averaging should be 5 minutes.
- Only one Option Card input or output can be set to trigger an EOI pulse.**

b. Enter **Units/Count**. The Units/Count is the **output ratio** from the device that is being input into the meter. **For example**, if you have a KYZ module that is outputting a pulse every 1.8 kWh, with the input set to Accumulator, Increment on Contact Opening, you would set the Units/Count to be the value of the KYZ; in this case either 1.8 or a ratio of that number.

- c. Enter **Compression**. The Compression Factor is used to **adjust how high** an accumulator will go **before rolling over**. For example, if you select a Compression Factor of 10, each time 10 Pulse/State changes occur, the accumulator count will increment by 1.
The **available Compression Factors** are: **1, 10, 100, 1000, 10000, and 100000**. The default Compression Factor is 1.
- d. Enter a **Label** for the **Accumulator**.
- e. The **current Input Labels** are displayed in the screen. To **change** the Input Labels, click in the **Labels** field you want to change, and enter a new label. The fields that can be changed are:
- Input Label – Input ID
 - Open Label – Open state ID
 - Closed Label – Closed state ID

Input Labels			
Input	Label	Open Label	Closed Label
1	Relay1_1	Relay1_1	Relay1_1
2	Relay2_1	Relay2_1	Relay2_1

Configuring a Pulse Output/Digital Input Card (IQ250/260-IO2):

The **Pulse Output/Digital Input Option Card** has:

- Four Pulse Outputs via solid state contacts
- Four wet/dry contact sensing digital inputs.

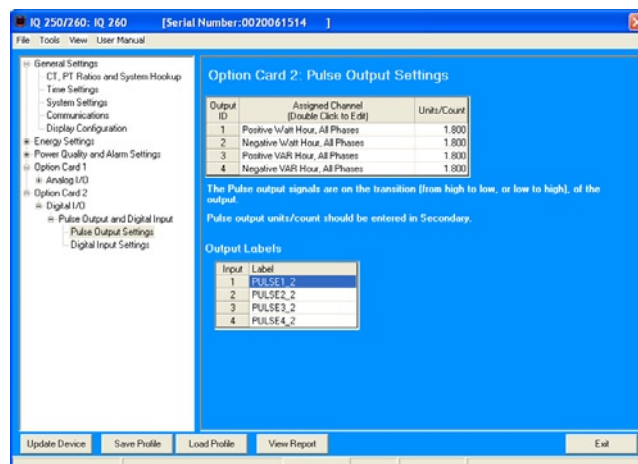
Accumulators in the software count the pulses of the Inputs and Outputs. For technical specifications and hardware installation, refer to Chapter 7 of this manual.

NOTE: When installing a **Pulse Output/Digital Input card**, we recommend you **reset the accumulators for the card**, in order to prevent erroneous counts. See instructions on using the Reset Device Information screen to reset card accumulators, later in this chapter.

An **example use** of the **Pulse Output/Digital Input Card** is in a sub-metering application where a pulse output is needed. The Input Accumulators allow you to count the pulses from another device, for example, a KYZ module or another meter. The Output Accumulators allow you to count the pulses being output by the card.

The **Pulse Output and Digital Input Card** has two screens for configuration: the **Pulse Output Settings** screen and the **Digital Input Settings** screen.

1. Click **Pulse Output Settings**.
 - You can set up to **four Output IDs** for your Card.
 - Each Output has a **Label**, an **Assigned Channel**, and a **Unit/Count**.



2. Double-click an **Assigned Channel** field to **add** or **edit** an Output ID.
You will see the window shown on the right.

Output ID	Counter Type	Units/Count
1	End of Interval Event	1.800
2		1.800
3		1.800
4		1.800

OK Cancel

3. Select the Counter Type. The available selections are:
 - **Energy, All Phases**
 - **End of Interval Event** – this counter is triggered by a Demand Averaging Interval
 - **Energy, Phase A**
 - **Energy, Phase B**
 - **Energy, Phase C**
 - **None.**

NOTE: If you select one of the **Energy Counter Types**, you will see the **Energy Counter** field, shown on the right. The available selections are: **Total Watt Hour; Positive Watt Hour; Negative Watt Hour; Total VAR Hour; Positive VAR Hour; Negative VAR Hour; VA Hour; Received Watt Hour; Delivered Watt Hour; Inductive VAR Hour; Capacitive VAR Hour.**

Counter Type: Energy, All Phases

Energy Counter: Positive Watt Hour

OK Cancel

4. Click **OK**. The **Counter Type** you selected displays in the **Assigned Channel** field of the **Pulse Output Settings** screen.
5. When you select the **Assigned Channel**, a value is entered for it in the **Units/Count** field. You can edit this field by double-clicking in it. The Units/Count is determined by the **Secondary** (the readings in the meter).
6. The **current Output Labels** are displayed on the screen. To **change** the Output labels, click in the Labels field you want to change, and enter a new label.
7. Click **Digital Input Settings**.

- You can set up to **four Input IDs** for your Card, and assign a Label, Open Label, and Closed Label for each.
- You can assign labels and other information for Accumulators for the Inputs.
 - a. Make a selection in the **Assigned to** field. The available selections are:
 - **Status Only**
 - **EOI Pulse, Trigger on Contact Closing**
 - **EOI Pulse, Trigger on Contact Opening**
 - **EOI Pulse, Trigger on Contact Change**
 - **Accumulator, Increment on Contact Closing**
 - **Accumulator, Increment on Contact Opening**
 - **Accumulator, Increment on Contact Change**

Input ID	Assigned to	Units/Count	Compression	Label
1	Status Only	0.0204	1	PULSEAcc1_2
2	Status Only	0.0204	1	PULSEAcc2_2
3	Status Only	0.0204	1	PULSEAcc3_2
4	Status Only	0.0204	1	PULSEAcc4_2

Note: The Compression field is used to adjust how high an accumulator will go before rolling over. If the Compression is set to 1, each time a Pulse/State change occurs, the accumulator count will increment by 1. If the Compression is set to 10, each time 10 Pulses/State changes occur, the accumulator count will increment by 1.

Input	Label	Open Label	Closed Label
1	PULSE1_2	PULSE1_2	PULSE1_2
2	PULSE2_2	PULSE2_2	PULSE2_2
3	PULSE3_2	PULSE3_2	PULSE3_2
4	PULSE4_2	PULSE4_2	PULSE4_2

Update Device Save Profile Load Profile View Report Exit

NOTES on End of Interval (EOI):

- EOI is triggered when the selected condition is met.
- EOI is used as a **trigger** for **demand averaging**: when the selected condition is met, the EOI delineates an interval that results in demand averaging being performed.
- The minimum interval between EOI Pulses used to trigger demand averaging should be 5 minutes.
- **Only one Option Card input or output can be set to trigger an EOI pulse.**

- b. Enter **Units/Count**. The Units/Count is the **output ratio** from the device that is being input into the meter. **For example**, if you have a KYZ module that is outputting a pulse every 1.8 kWh, with the input set to Accumulator, Increment on Contact Opening, you would set the Units/Count to be the value of the KYZ; in this case either 1.8 or a ratio of that number.

NOTE: When EOI is chosen for the Assigned to, a pulse is generated on the selected EOI Event. When this option is chosen, you do not need to set **Units/Count**.

- c. Enter **Compression**. The **Compression Factor** is used to adjust how high an accumulator will go before rolling over. Because of this, it is useful for **delaying rollover**. **For example**, if you select a Compression Factor of 10, each time 10 Pulse/State changes occur, the accumulator count will increment by 1. The **available Compression Factors** are: **1, 10, 100, 1000, 10000, and 100000**. The default Compression Factor is 1.

- d. Enter a **Label** for the **Accumulator**.

- The current Input Labels are displayed on the screen. To change the Input Labels, click in the Labels field you want to change, and enter a new label.

Input Labels			
Input	Label	Open Label	Closed Label
1	PULSE1_2	PULSE1_2	PULSE1_2
2	PULSE2_2	PULSE2_2	PULSE2_2
3	PULSE3_2	PULSE3_2	PULSE3_2
4	PULSE4_2	PULSE4_2	PULSE4_2

Configuring a 0-1 mA Output Card (IQ250/260-IO3):

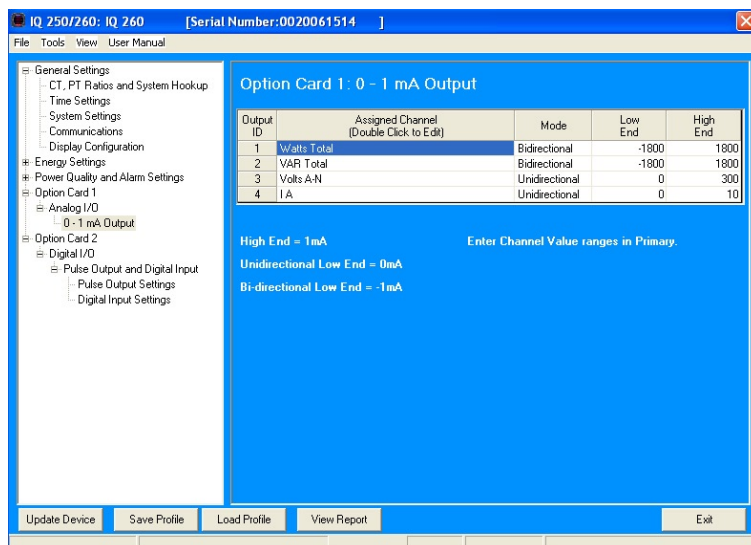
The **0-1mA Output Option Card** is an **analog communication card**, which transmits a standard, bi-directional 0-1 milliamp signal. For technical specifications and hardware installation, see Chapter 7 of this manual.

An **example use** of the optional 0-1mA Output Card is in enabling the meter to communicate with an RTU (Remote Terminal Unit).

- Click **0-1 mA Output**.

- You can set up to four Output IDs for your Output Card.

- Double-click an **Assigned Channel** field to **add** or **edit** an **Output ID**. You will see the window shown on the next page.



3. Select **Group** for your **Output Channel**. The available selections are as follows:

- Readings
- Demand
- Maximums
- Minimums
- Phase Angles
- THD
- Not Assigned.



4. Select **Item** for your **Output Channel**. The items are the available readings for the group you selected. **For example**, as shown in the window above, Volts A-N is an item you can select when you have selected Readings as the Group.

5. Click **OK**. The Output Channel you selected is displayed in the Assigned Channel field.

6. Enter **Low End** and **High End** for the channel.

NOTE: For the Item selected for the Assigned Channel, the Output Card takes the value in the meter and outputs a DC current within its range. The Low End is the lowest value, and the High End is the highest value. For example, for VOLTS A-N and Bidirectional Mode, at Full Scale of 120V, the Low End is 115V and the High End is 125V. The Analog Output Card will output –1 mA when the reading is 115V, 0 mA when the reading is 120V, and 1 mA when the reading is 125V.

7. You can select either **Unidirectional** or **Bidirectional** for **Mode**.

8. Enter an **Update Rate**. The **suggested rate** is between 100 and 200 msec.

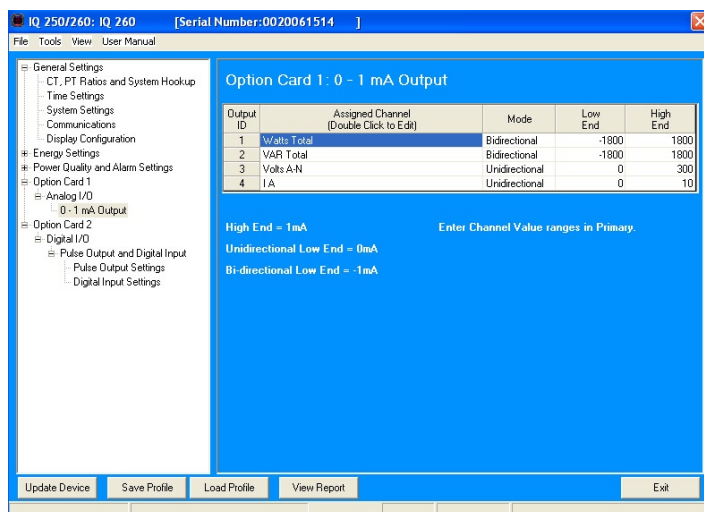
Configuring a 4-20 mA Output Card (IQ250/260-IO4):

The **4-20mA Output Option Card** is an **analog communication card**, which transmits a standard, uni-directional 4-20 milliamp signal. For technical specifications and hardware installation, see Chapter 7 of this manual.

An example use of the optional 4-20mA Output Card is in enabling the meter to communicate with an RTU (Remote Terminal Unit).

Click **4-20 mA Output**.

Follow the instructions for configuring the **0-1 mA Card**. The configuration of a **4-20 mA Card** is the same as a **0-1 mA Card**, except that this card can only be unidirectional.



Polling the IQ 250/260 Meter

- The **Real Time Poll** features of IQ 250/260 Configuration Software are used to continuously view **instantaneous values** within an IQ 250/260 Meter. The software provides tabular views of metered values, circuit measurements, interval data, Power Quality values, Pulse data and Input/Output status and accumulations.

The **Real Time Poll** features are divided into three groups, accessed by clicking the **Real Time Poll** menu in the **Title Bar**:

- Real Time Readings
- Revenue, Energy and Demand Readings
- Power Quality and Alarms



When you click **Real Time Readings**; **Revenue, Energy and Demand Readings**; and **Power Quality and Alarms**, you will see a sub-menu that allows you to select individual polling screens.

- **NOTE:** Clicking the **Polling Icon** on the **Title Bar** is the same as selecting **Instantaneous Polling** from the **Real-Time Poll>Real Time Readings** menu; clicking the **Phasors Icon** on the **Title Bar** is the same as selecting **Phasors** from the **Real-Time Poll>Power Quality and Alarms** menu.

Instantaneous Polling

- Click **Real-Time Poll>Real Time Readings>Instantaneous Polling**. You will see the screen shown below.
NOTE: You will only see the THD Readings if you are connected to an IQ 260.

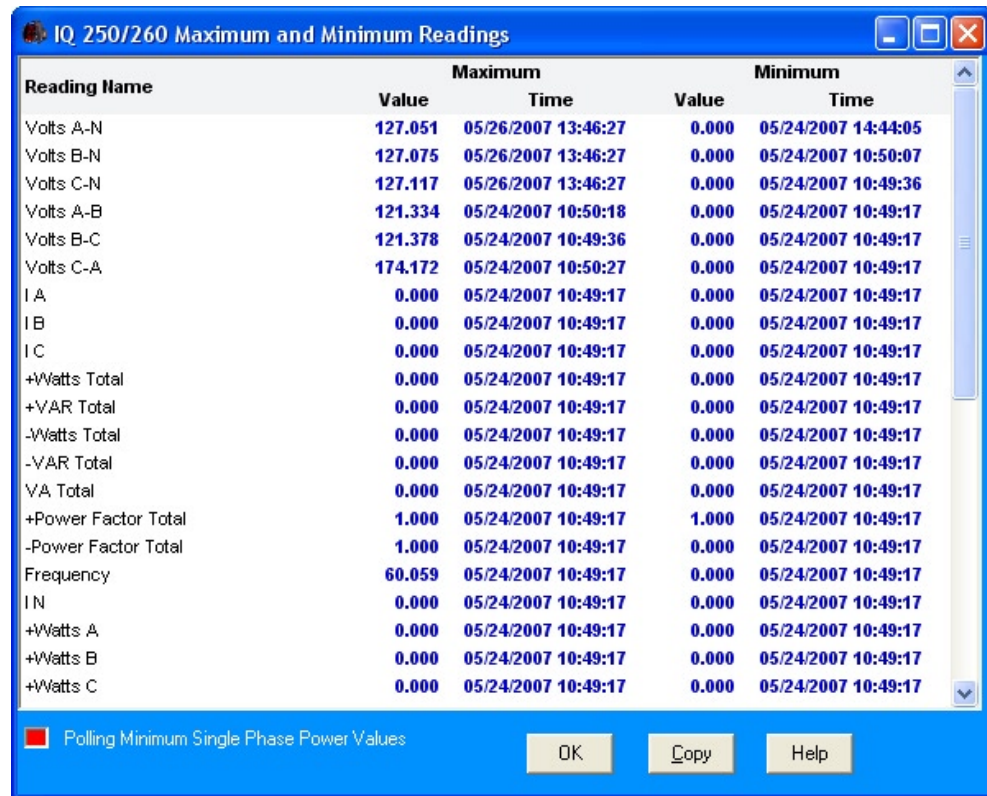
Polling									
Volts		Current (I)			THD(%)				
	Instantaneous		Instantaneous	Maximum		Voltage	Current		
A-N	123.08	A	0.00	0.00	A	1.77	****		
B-N	123.11	B	0.00	0.00	B	1.77	****		
C-N	123.12	C	0.00	0.00	C	1.84	****		
A-B	0.00	Nc	0.00	0.00					
B-C	0.00								
C-A	0.00								
		Frequency 59.987							
Real Power (W)									
	Total	A	B	C					
Inst.	0.00	0.00	0.00	0.00					
+Average	0.00	0.00	0.00	0.00					
-Average	0.00	0.00	0.00	0.00					
+Maximum	0.00	0.00	0.00	0.00					
-Maximum	0.00	0.00	0.00	0.00					
Reactive Power (vars)					Apparent Power (VAs)				
	Total	A	B	C	Total	A	B	C	
Inst.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
+Average	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
-Average	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
+Maximum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
-Maximum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
☐ Polling IQ 260 OK Print Help									

- Click **Print** to print a copy of the screen.
- Click **Help** to view instructions for this screen.
- Click **OK** to return to the main screen.

Poll Max and Min Readings

Click **Real-Time Poll>Real Time Readings>Poll Max and Min Readings**. You will see the screen shown below.

This screen displays the maximum and minimum values and the time of their occurrence for all of the IQ 250/260 Real-Time readings. Use the scroll bar to view readings not displayed on the screen.



Reading Name	Maximum		Minimum	
	Value	Time	Value	Time
Volts A-N	127.051	05/26/2007 13:46:27	0.000	05/24/2007 14:44:05
Volts B-N	127.075	05/26/2007 13:46:27	0.000	05/24/2007 10:50:07
Volts C-N	127.117	05/26/2007 13:46:27	0.000	05/24/2007 10:49:36
Volts A-B	121.334	05/24/2007 10:50:18	0.000	05/24/2007 10:49:17
Volts B-C	121.378	05/24/2007 10:49:36	0.000	05/24/2007 10:49:17
Volts C-A	174.172	05/24/2007 10:50:27	0.000	05/24/2007 10:49:17
I A	0.000	05/24/2007 10:49:17	0.000	05/24/2007 10:49:17
I B	0.000	05/24/2007 10:49:17	0.000	05/24/2007 10:49:17
I C	0.000	05/24/2007 10:49:17	0.000	05/24/2007 10:49:17
+Watts Total	0.000	05/24/2007 10:49:17	0.000	05/24/2007 10:49:17
+VAR Total	0.000	05/24/2007 10:49:17	0.000	05/24/2007 10:49:17
-Watts Total	0.000	05/24/2007 10:49:17	0.000	05/24/2007 10:49:17
-VAR Total	0.000	05/24/2007 10:49:17	0.000	05/24/2007 10:49:17
VA Total	0.000	05/24/2007 10:49:17	0.000	05/24/2007 10:49:17
+Power Factor Total	1.000	05/24/2007 10:49:17	1.000	05/24/2007 10:49:17
-Power Factor Total	1.000	05/24/2007 10:49:17	0.000	05/24/2007 10:49:17
Frequency	60.059	05/24/2007 10:49:17	0.000	05/24/2007 10:49:17
I N	0.000	05/24/2007 10:49:17	0.000	05/24/2007 10:49:17
+Watts A	0.000	05/24/2007 10:49:17	0.000	05/24/2007 10:49:17
+Watts B	0.000	05/24/2007 10:49:17	0.000	05/24/2007 10:49:17
+Watts C	0.000	05/24/2007 10:49:17	0.000	05/24/2007 10:49:17

☒ Polling Minimum Single Phase Power Values

OK Copy Help

- Click Copy to copy the readings to the clipboard. You can then paste them into another document, for example, an Excel file.
- Click OK to close the screen.

Poll Power and Energy

- Click **Real-Time Poll>Revenue, Energy and Demand Readings>Power and Energy**. You will see the screen shown below.

Power and Energy				
	Total	Phase A	Phase B	Phase C
Power				
		Max Demand	Min Demand	
Apparent(VA)	0.00	0.00	0.00	
Real(+ Watts)	0.00	0.00	0.00	
Real(- Watts)	0.00	0.00	0.00	
Reactive(+ VARs)	0.00	0.00	0.00	
Reactive(- VARs)	0.00	0.00	0.00	
+ PF	1.000	1.000	1.000	
- PF		1.000	0.000	
Demand Window: Sliding Window				
Integration Period: 15 minutes				
Energy				
	Received	Delivered	Net	Total
Watt-hr	0000000.0k	0000000.0k	0000000.0k	0000000.0k
VAR-hr	0000000.0k	0000000.0k	0000000.0k	0000000.0k
VA-hr				0000000.0k
☒ Polling OK Print Help				

This screen displays the **power** and **energy** for **Total Power** and all three **phases**.

1. Click the **tabs** at the top of the screen to select the view you want:
 - **Total**
 - **Phase A**
 - **Phase B**
 - **Phase C**
2. Click **Print** to print the readings.
3. Click **OK** to close the screen.

Poll Accumulators

- Click **Real-Time Poll>Revenue, Energy and Demand Readings>Accumulations**. You will see the screen shown on the right.

This screen displays the current readings for the Input and Output **Accumulators** of any installed Relay Output/Digital Input and Pulse Output/Digital Input Option cards.

The readings are shown after the configured Compression and Units/Count have been applied. For information on setting Compression and Units/Counts for Accumulators, refer to the instructions for configuring Relay Output/Digital Input and Pulse Output/Digital Input Cards, earlier in this chapter.

Click **OK** to close the screen.

Accumulators

Option Card 2

Scaled Input

PULSE1_2 0.000
 PULSE2_2 0.000
 PULSE3_2 0.000
 PULSE4_2 0.000

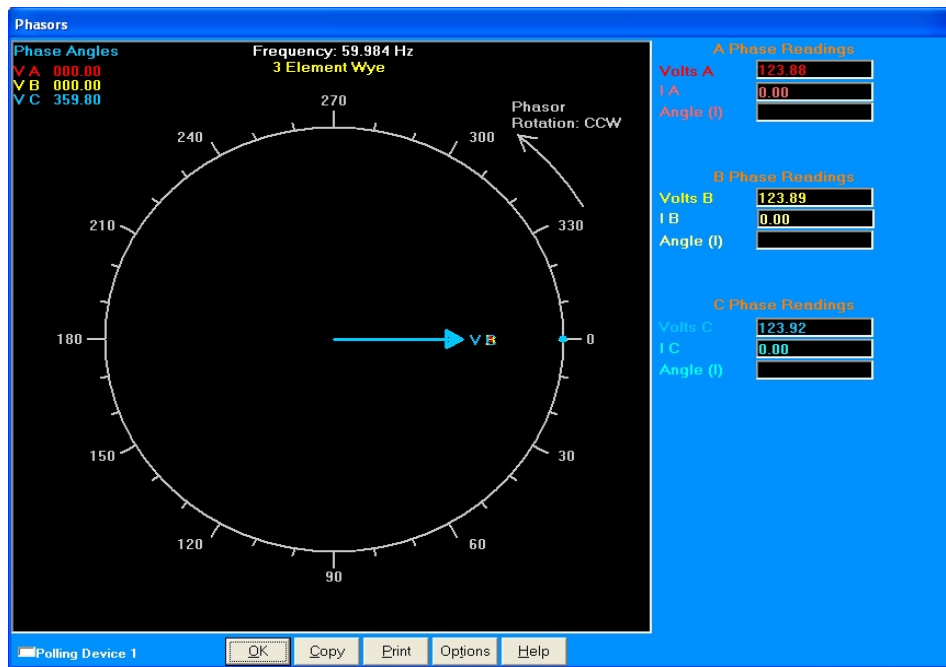
Scaled Output

PULSE1_2 0.000
 PULSE2_2 0.000
 PULSE3_2 0.000
 PULSE4_2 0.000

☒ Polling
 OK Help

Poll Phasors

1. Click **Real Time Poll>Power Quality and Alarms>Phasors**. You will see the screen shown below.



The **Phasors** screen displays the Phase relationships of the currently connected IQ 250/260. If you have an **auxiliary voltage** reading (i.e. generator and bus where the V Aux is the generator), Aux box and the V Aux phaser are displayed. The V Aux phaser is referenced to V A phase.

2. To adjust the Phasor **display**, click **Options** at the bottom of the screen. You will see the screen shown on the right.
 - a. In the **Display Angles Increasing** and **Phasor Rotation** boxes, select either **Clockwise** or **Counter Clockwise**.
 - b. From the **pull-down menu** at the bottom of the screen, select **Vectors**, **Triangles** or **Vectors and Triangles** to change the graphic representation of the data.

The screenshot shows the 'IQ 250/260 Phasor Diagram Options' screen. It has two sections: 'Display Angles Increasing' and 'Phasor Rotation'. Each section has two radio buttons: 'Clockwise' and 'Counter Clockwise'. Below these is a 'Display' dropdown menu set to 'Vectors'. At the bottom is an 'OK' button.

IQ 250/260 Phasor Diagram Options

Display Angles Increasing

☒ Clockwise ☐ Counter Clockwise

Phasor Rotation

☐ Clockwise ☒ Counter Clockwise

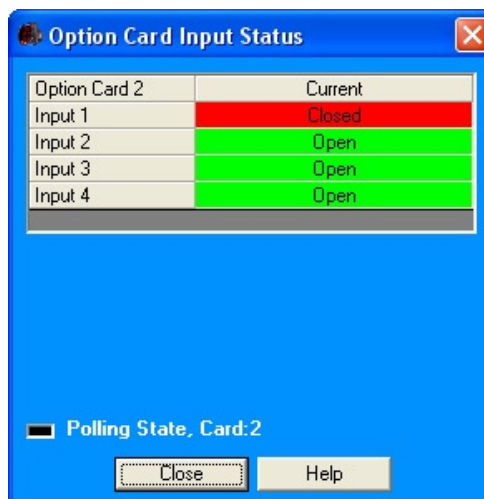
Display Vectors

OK

- 3 Click **OK** to save your selections and return to the **Phasors** screen.
 - Click **Copy** to save a copy of the screen to the clipboard.
 - Click **Print** to send a copy of the graph to a printer.
 - Click **Help** to view instructions for this screen.
 - Click **OK** to return to the main screen.

Poll Status Inputs

1. Click **Real Time Poll>Power Quality and Alarms>Poll Status Inputs**. You will see the screen shown below.



This screen displays the status (**Open** or **Closed**) of the **Digital Inputs** of any installed **Relay Output/Digital Input** or **Pulse Output/Digital Input** Option cards.

2. Click **Close** to close the screen.

Poll Limits (IQ 260 Only)

Click **Real-Time Poll>Power Quality and Alarms>Limits**. You will see the screen shown below.



Limit ID	Label	Value	Status		Limit 1			Limit 2		
			Limit 1	Limit 2	Setting	Point	Hysteresis	Setting	Point	Hysteresis
Limit 1	Volts A-B	0.00	In	Out	Above	660.000	660.000	Below	540.000	540.000
Limit 2	Volts B-C	0.00	In	Out	Above	660.000	660.000	Below	540.000	540.000
Limit 3	Volts C-A	0.00	In	Out	Above	660.000	660.000	Below	540.000	540.000
Limit 4	I A	0.00	In	Out	Above	5.500	5.500	Below	4.500	4.500
Limit 5	I B	0.00	In	Out	Above	5.500	5.500	Below	4.500	4.500
Limit 6	I C	0.00	In	Out	Above	5.500	5.500	Below	4.500	4.500
Limit 7	Watts Total	0.00	In	Out	Above	9900.000	9900.000	Below	8100.000	8100.000
Limit 8	Frequency	59.99	In	In	Above	66.000	66.000	Below	54.000	54.000

Buttons: OK, Print, Help

This screen shows the current **status** of any **Limits** programmed in the **Device Profile**.

NOTE: See instructions for configuring Limits, earlier in this chapter.

1. The **displayed fields** are:

- **Limit ID** – the identification of the limit.
- **Label** - the item the Limit is set for.
- **Value** – the current reading for this item.
- **Status/Limit1/Limit2** – whether the current reading is “In” or “Out” for the Above (Limit 1) and Below (Limit 2) Setpoints.
- **Limit 1/Setting/Point/Hysteresis** – Above: the point above which the reading goes out of limit (Setpoint) and the point at which it returns to within limit (Hysteresis).
- **Limit 2/Setting/Point/Hysteresis** – Below: the point below which the reading goes out of limit (Setpoint) and the point at which it returns to within limit (Hysteresis).

2. Click **Print** to print the screen.

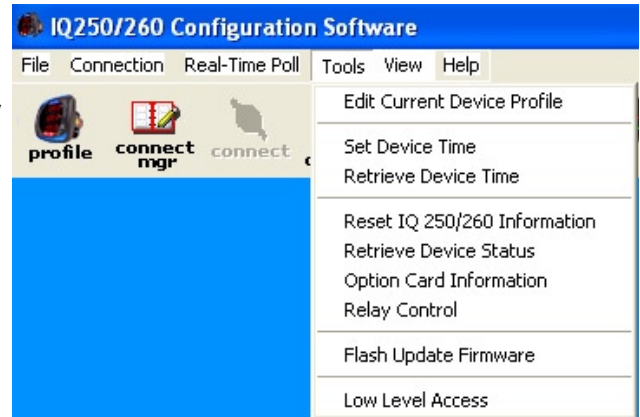
3. Click **OK** to close the screen.

Using the IQ 250/260 Tools Menu

The **Tools Menu** allows you to access specific functions for the IQ 250/260 Meter. Click **Tools** from the **Title Bar** to display the Tools Menu.

Accessing the Device Profile Screen

Click the first option, **Edit Current Device Profile**, to open the **Device Profile** screen. This menu option performs the same function as clicking the **Profile** icon in the **Title Bar**.



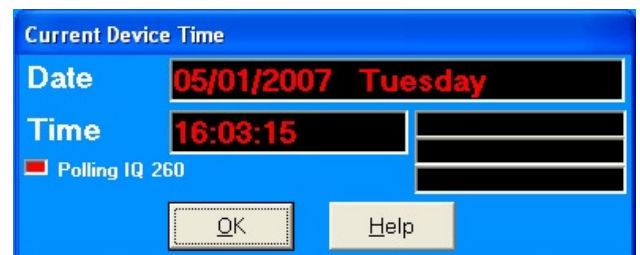
Setting Device Time

1. Click **Tools>Set Device Time**. You will see the screen shown on the right. This screen allows you to **set** the meter's **internal clock** and/or **synchronize** it to your **PC's** time. The meter's clock is used for logging and other time retrieval purposes.
2. You can enter a new Month, Day, and Year in the **Date** fields.
3. Check the box next to **Use PC Time** to synchronize the meter to your PC; uncheck the box if you want to **reset** the time **manually**. You can then enter the Hour, Minute, and Seconds you want in the **Time** fields.
4. Click **Send** to send the new date and/or time to the meter; click **Cancel** to close the screen.



Retrieving Device Time

1. Click **Tools>Retrieve Device Time**. You will see the screen shown on the right. This screen **displays** the meter's **internal time**. If **Daylight Savings Time** is enabled, '**DST**' will display in one of the fields to the right of the **Time** field.
2. Click **OK** to close the screen.

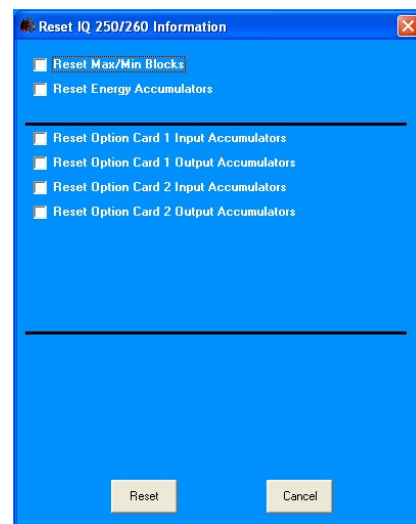


Resetting Device Information

1. Click **Tools>Reset Device Information**. You will see the screen shown on the right.
2. Select the items you want to reset and click **Reset**.

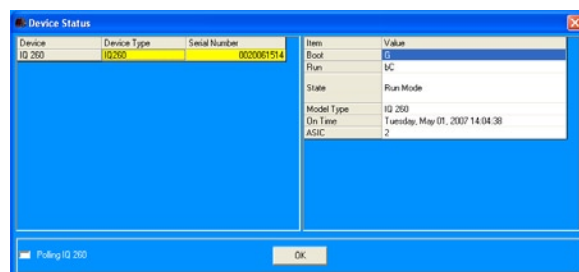
NOTES:

- You can reset **Max/Min Blocks**, **Energy Accumulators**, and **Option Card Accumulators**.
- When installing a **Pulse Output/Digital Input** card or a **Relay Output/Digital Input** card, we recommend you reset the accumulators for the card, in order to prevent erroneous counts.
- This feature requires a **Password** if **Password for Reset** is **enabled** for the meter.



Retrieving Device Status

1. Click **Tools>Retrieve Device Status**. you will see the screen shown on the right.
NOTE: This is the same screen that opens when you first connect to the meter.
2. This screen shows the **status** of any **connected devices**. If more than one meter is displayed, **click** on a **device** to display detailed information for it on the right side of the screen.
3. Click **OK** to close the screen.



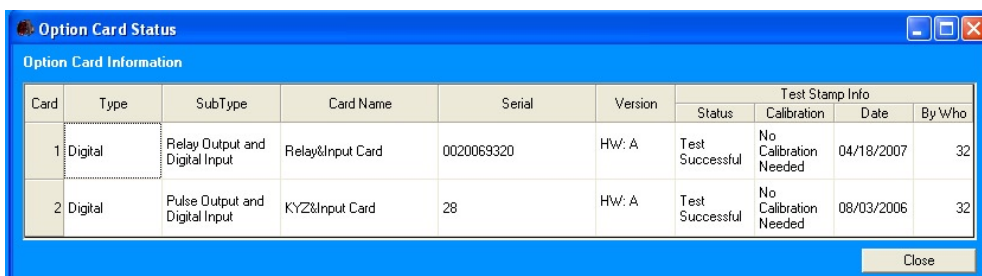
Viewing Option Card Information

1. Click **Tools>Option Card Information**. You will see the screen shown on the right.

This screen displays detailed information about any Option cards installed in the meter:

- Type
- Sub Type
- Card Name
- Serial Number
- Version
- Test Information.

2. Click **Close** to close the screen.



Performing Manual Relay Control

1. Click **Tools>Relay Control**. You will see the screen shown on the right.
This screen allows you to **manually set the state** of any installed **Relay Output/Digital Input** cards.
2. The screen displays the **current** Relay state. To change the state:
 - a. Select the state you want in the **Select New State** field.
 - b. **Click the checkbox** next to the **Relays** you want to **change** to the new state.
 - c. Click **Apply**.

NOTE: If this feature is **Password Protected**, the **Enter Password** screen opens.

3. Click **OK** to close the screen.

NOTES:

- A Relay **cannot be manually controlled** if a **Limit** has been assigned to it. See the instructions for configuring a Relay Output/Digital Input Card, earlier in this chapter. (This only applies to the IQ 260 meter.)
- If the **Relay State** field is **"State is Unknown,"** verify that the **Relay configuration** is correct. You may also see this message after you have performed a **Reset**. Select a **New State** for the Relay and click **Apply**.

Performing Firmware Flash Update

1. Click **Tools>Flash Me**. You will see the screen shown on the right.
This function allows you to update the IQ 250/260's firmware.
2. Click **Browse** to locate the flash file.
3. Click **Flash** to update the firmware with the flash file.
4. When Flash is complete, click **Exit** to close the screen.

This Bar Shows Flashing Progress →

NOTE: If **Flash Update** fails, you will see a message to that effect. Check **Device Status** (see instructions on the previous page) to see if your meter is in **Boot Mode**.

- If the meter is in **Boot Mode**, **uncheck** the **Starting from Run Mode** box in the **Flash Me** screen and try flash updating the firmware again.
- If the meter's status is not displayed in the **Device Status** screen, the meter may be stuck in **Boot Mode**. If you are certain the communication settings are correct for the meter, try connecting to the meter using the following defaults:

Address 001
Baud Rate 9600
Protocol Modbus RTU

Once you connect to the meter, you can try flash upgrading again.

Performing Additional Tasks with IQ 250/260 Configuration Software

The following sections contain instructions for other tasks you can perform with the IQ 250/260 Configuration Software.

Using Connection Manager

Use **Connection Manager** to **Add** or **Remove** Connection **Locations** and/or **Devices** at **Locations**.

1. Click **Connection>Connection Manager** or click on the **Connect Mgr** icon. You will see the screen, shown on the right.

List of Locations:

On the left side of the **Connection Manager** screen is a **List of Locations**. These are the locations of one or more meters to which you can connect. You can **Add a Location** and/or a **Device**; **Edit a Location** and/or **Device**; or **Remove a Location** and/or **Device**.

• To Add a Location:

- a. Click on the **Add** button. You will see the **Connection Manager Location Editor** screen. On this screen, you program the **Communication settings** for each **New Location**.
- b. Type a **Name** for the **New Location**.
- c. Click **Serial Port** or **Network**.
- d. Enter **Communications Settings**:

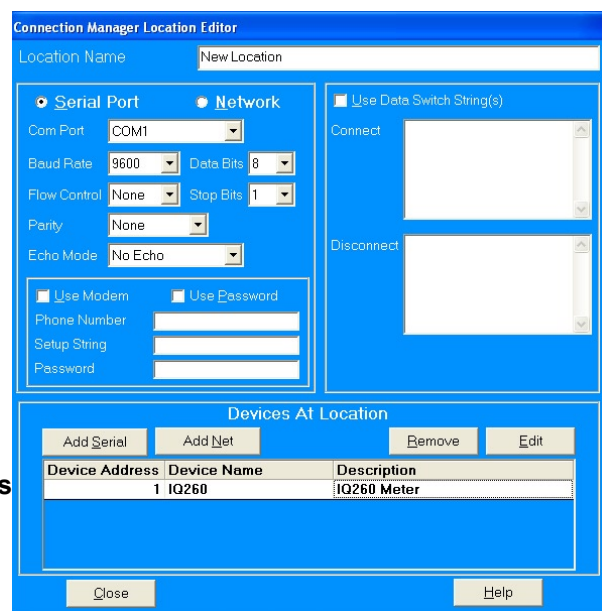
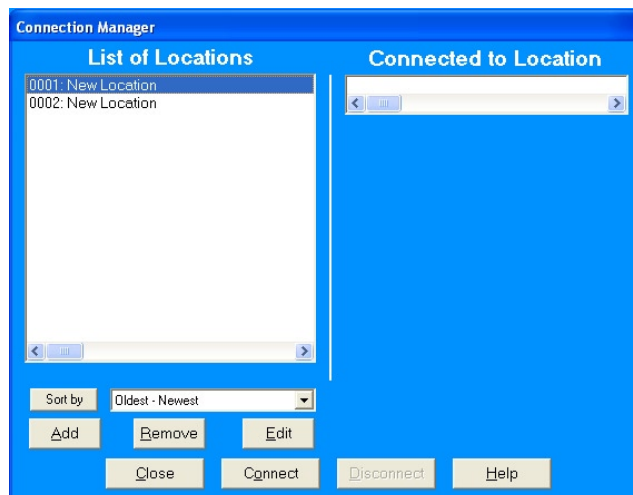
Com Port: COM 1 - 99
 Baud Rate: 1200 - 115200
 Flow Control: None or Hardware
 Data Bits: 8 (or 7)
 Parity: None (Even, Odd)

e. To Add a Device:

- Click **Add Serial** (to add a Serial Port Connected Device) or **Add Net** (to add a Network Connected Device) in the **Devices at Location** box. You can add up to **255 Devices** (Serial Port and/or Network connected) at one **Location**.

NOTES:

- All devices must have the same connection parameters: Baud, Parity and Flow Control.
- Multiple Devices slow down polling.



f. **To Edit a Device:**

- Select the Device from the **Devices at Location** box. (Scroll down to find all devices.)
 - Click **Edit**. You will see the **Connection Manager Location Device Editor** screen, shown on the right.
 - Use this screen to program the **Device Properties** for each device at a Location.
 - If the Device has a **Serial Port Device Connection**, you will see the first (top) example screen.
 - If the Device has a **Network Device Connection**, you will see the second example screen.
- Click the **Network** or **Serial** button at the top of the screen to **switch** connection **screens**.

The screenshot shows the 'Connection Manager Location Device Editor' window with the 'Network' tab selected. The 'Device Properties' section includes the following fields: Address (1), Name (Device 1), Description (Device 1), Protocol (Modbus RTU), Device Type (IQ 250/260), and Comm Port (1). At the bottom are 'Close' and 'Help' buttons.

- Enter **Device Properties**:

Address: 1 - 247 (Unique Address)
Name: Device Name
Description: (Type and Number, for example)
Protocol: Modbus RTU, ASCII, or Modbus TCP
Device Type: IQ 250/260
Comm Port: 1 or 2 (Serial Port Only)
IP Address: 100.10.10.10 (for example) (Network Only)
Port Number: 502 (Default) (Network Only)

The screenshot shows the 'Connection Manager Location Device Editor' window with the 'Serial' tab selected. The 'Device Properties' section includes the following fields: Address (1), Name (Device 1), Description (Device 1), Protocol (Modbus RTU), Device Type (IQ 250/260), IP Address (255.255.255.0), and Network Port (1). At the bottom are 'Close' and 'Help' buttons.

- Click **Close** to save settings and return to the **Connection Manager Location Editor** screen.

g. To **Remove a Device**, select the **Device** from the **Devices at Location** box and click **Remove**.

h. Click **Close** to return to the **Connection Manager** screen.

• **To Edit a Location:**

- a. Select a **Location** from the **List of Locations** box.
- b. Click the **Edit** button. The **Connection Manager Location Editor** screen appears, displaying the current settings for the location.
- c. Make any **changes** to settings and/or devices at the location.
- d. Click **Close** to exit the screen.

• **To Remove a Location:**

- a. Select a **Location** from the **List of Locations** box.
- b. Click **Remove**.
- c. Click **Yes** in the **Confirmation** window.

• **To Sort List of Locations:**

- a. Select a **sort method** (A-Z, Z-A, Newest-Oldest or Oldest-Newest) from the pull-down menu.
- b. Click **Sort By**.

- **To Connect to a Location:**

- a. Select the **Location** you want to connect to from the **List of Locations** box.

NOTE: You may only connect to one location at a time. To change to a different location, you must **disconnect** from the **current location** by selecting it and clicking **Disconnect**.

- b. Click **Connect**. When the connection is made, the selected location appears in the **Connected To Locations** section of the screen.
 - c. Click **Close**. The **Device Status** screen opens, confirming the connection. The **Computer Status Bar** at the bottom of the screen also confirms the computer's connection parameters.

NOTE: If the connection fails, a popup screen will alert you. Check that all cables are secure, that the RS-232 cable is connected to the correct Com Port on the computer, and that the computer is set to use the same baud rate and protocol as the meter to which the computer is connected.

Disconnecting from an IQ 250/260

To **disconnect** from an IQ 250/260 Meter or from a location, do one of the following:

- Click on the **Disconnect** icon in the **Title Bar**.
- Select **Connection>Disconnect** from the **Title Bar**.
- From the **Connection Manager** screen, select the location from the **Connected to Location** field and click the **Disconnect** button.

Changing the Primary Device/Address

Use this feature to select another meter as the primary device.

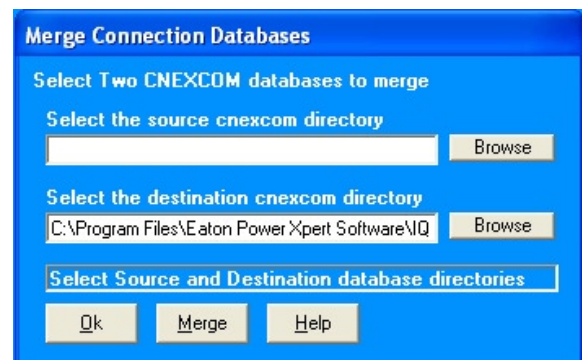
1. Click **Connect>Change Primary Device/Address**. You will see the screen on the right.
2. Enter the **address** of the device you want to designate as the new **Primary Device**.
3. Click **OK**.



Merging Connection Databases

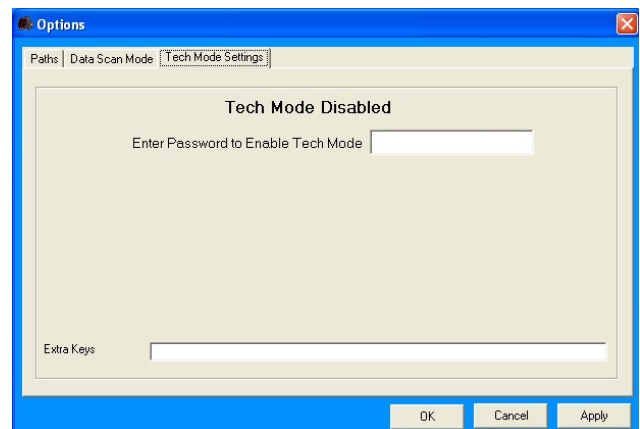
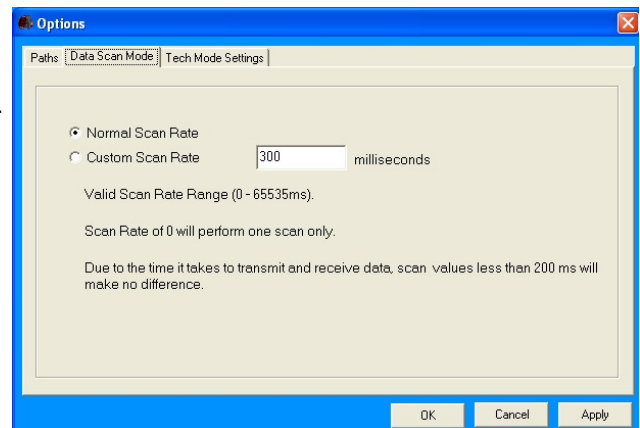
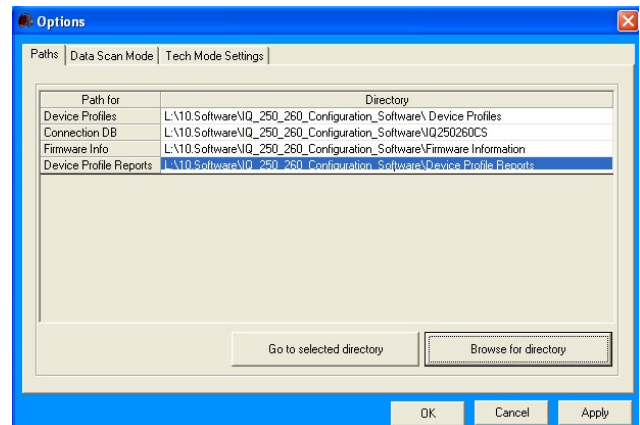
Use this feature to combine two sets of cnexcom databases.

1. Click **Connection>Merge Connection Databases**. You will see the screen on the right. It allows you to select the two databases to merge.
2. Click the **Browse** button next to each field to pick the databases. The **Source** cnexcom database will be merged into the **Destination** cnexcom database.
3. Click the **Merge** button to proceed with the merge; click **OK** to exit the screen.



Using the Options Screen

1. Click **View>Options**. You will see the screen shown on the right.
Use this screen to access the following features:
 - Paths for IQ 250/260 Configuration Software files
 - Data Scan Mode
 - Tech Mode Settings
 Use the tabs at the top of the screen to access the features.
2. The first **Options** screen is the **Paths** screen, shown on the right. Use this screen to view or change the paths the IQ 250/260 configuration software uses for data.
3. Click the **Data Scan Mode** tab to see the second screen on the right. Use this screen to select **Normal Scan rate** or to enter a **custom Scan rate**.
4. Click the **Tech Mode** tab to see the third screen on the right. Use this screen to access Tech Mode, by entering a valid password.
5. Click:
 - **Apply** to apply your selection(s) and keep the Options screen open.
 - **Okay** to apply your selection and close the Options screen.
 - **Cancel** to close the Options screen without saving any selections that have not been applied (using the Apply button).



Using the Help Menu

The **Help** menu, accessed by clicking **Help** in the **Title Bar**, allows you to:

- View this manual online: click **Help>User Manual**.
- View information about the IQ 250/260 Configuration Software, including version number: click **Help>About IQ 250/260 Configuration Software**.

App. A IQ 250/260 Navigation Maps

Introduction

You can configure the IQ 250/260 and perform related tasks using the buttons on the meter face.

- Chapter 6 contains a description of the buttons on the meter face and instructions for programming the meter using them.
- The meter can also be programmed using software. See chapter 8 for instructions on programming the meter using the IQ 250/260 Configuration Software.

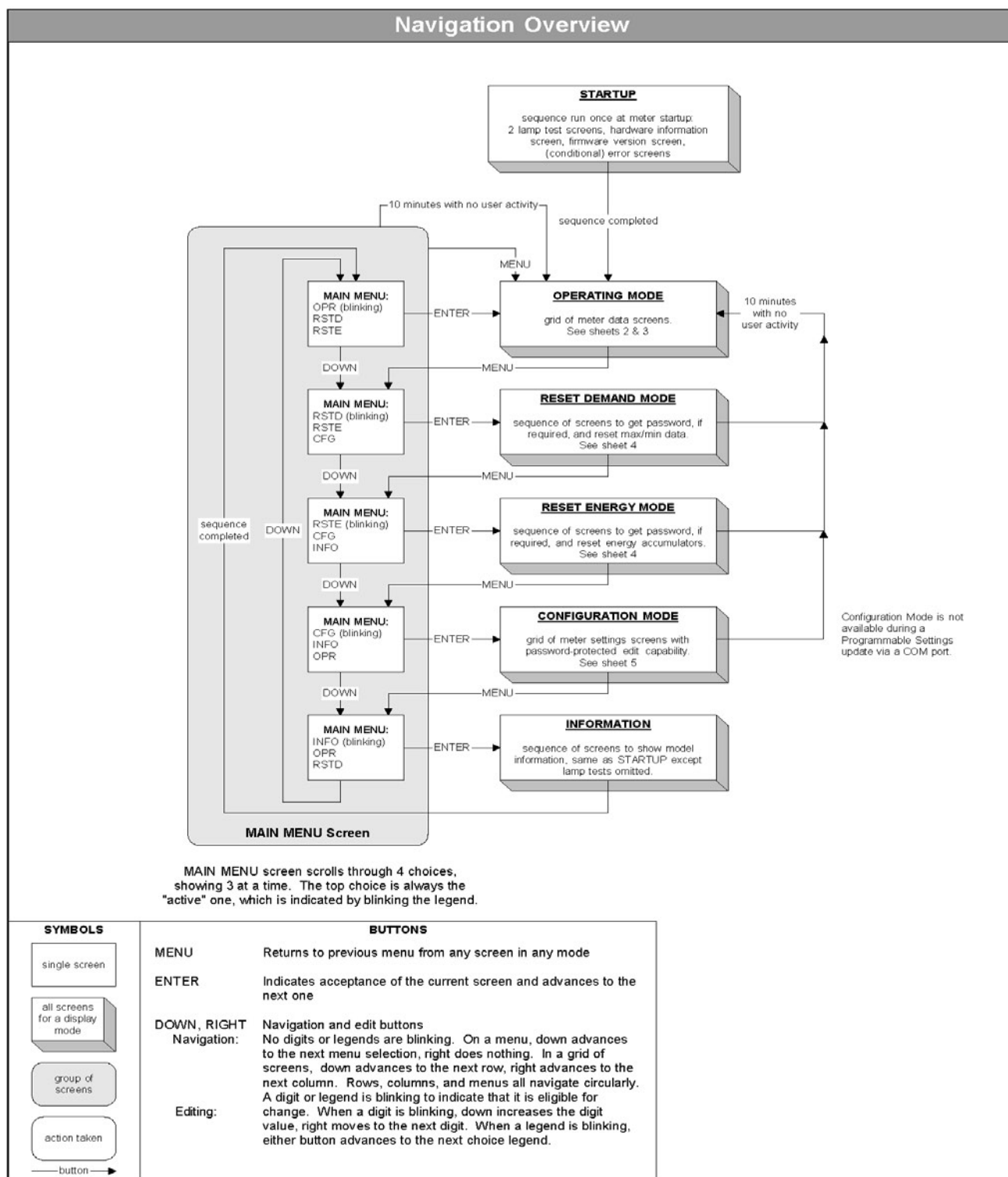
Navigation Maps (Sheets 1 to 4)

The IQ 250/260 Navigation Maps begin on the next page. The maps show in detail how to move from one screen to another and from one Display Mode to another using the buttons on the face of the meter. All Display Modes will automatically return to Operating Mode after 10 minutes with no user activity.

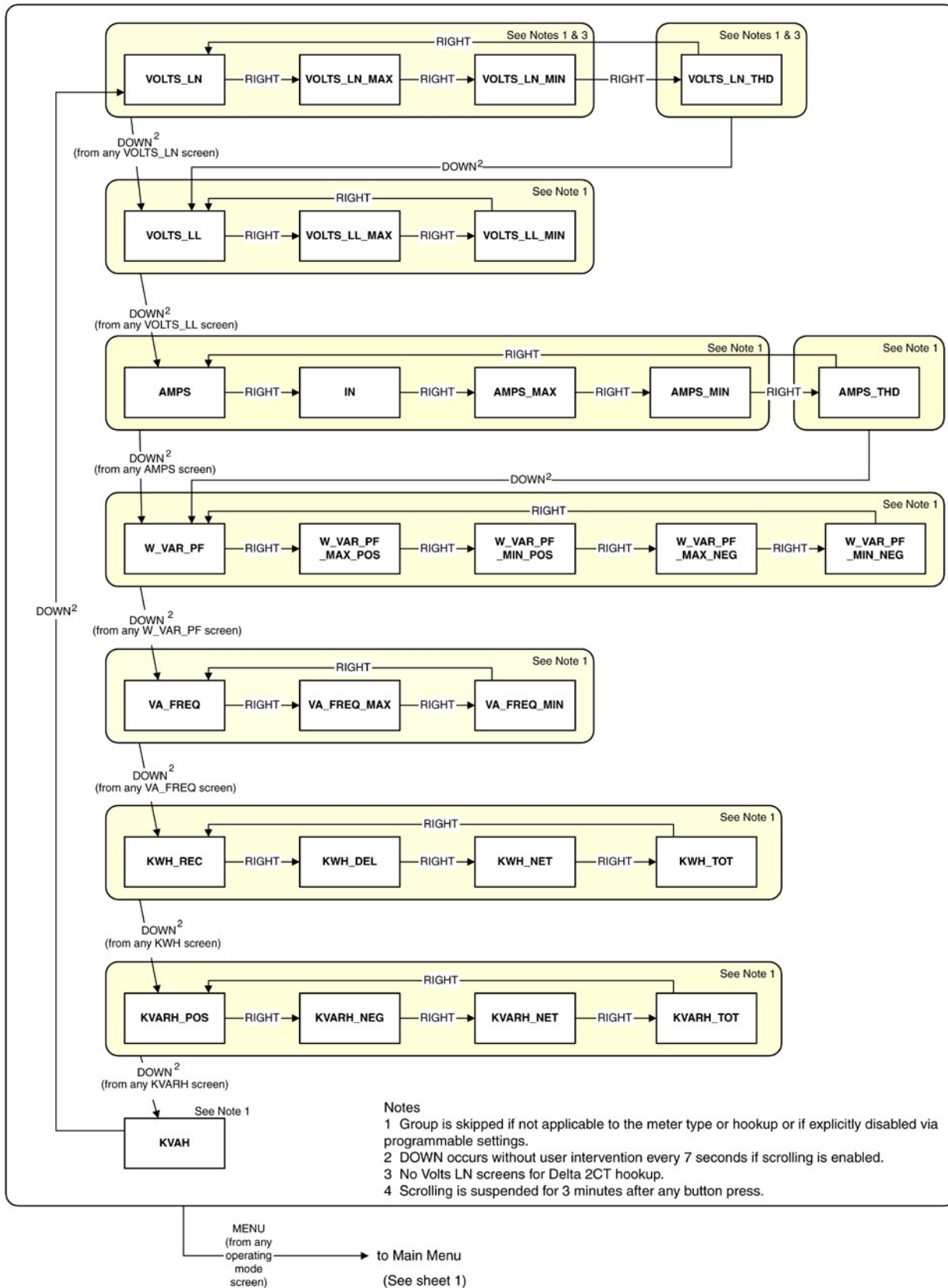
IQ 250/260 Navigation Map Titles:

- Main Menu Screens (Sheet 1)
- Operating Mode Screens (Sheet 2)
- Reset Mode Screens (Sheet 3)
- Configuration Mode Screens (Sheet 4)

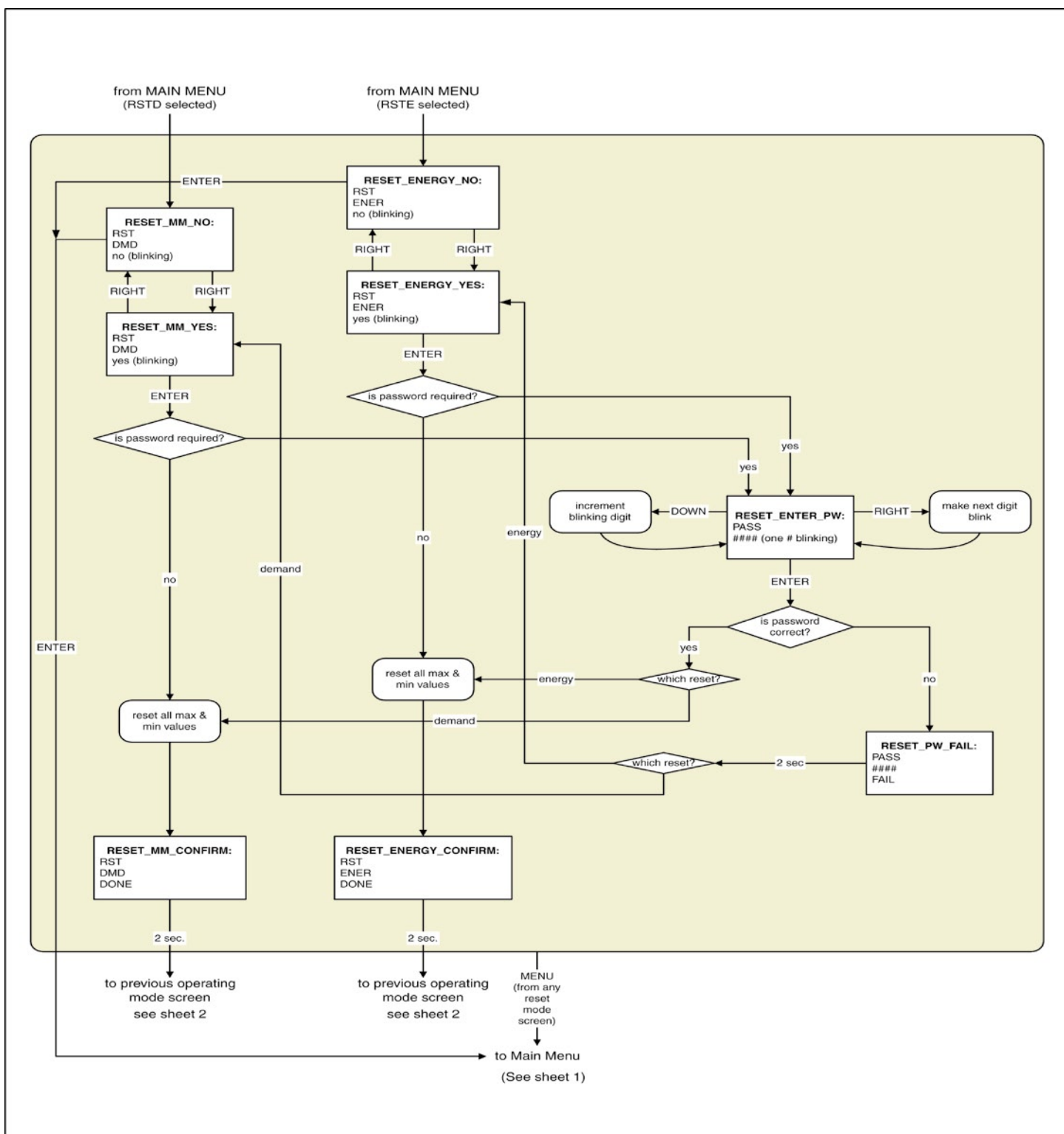
Main Menu Screens (Sheet 1)



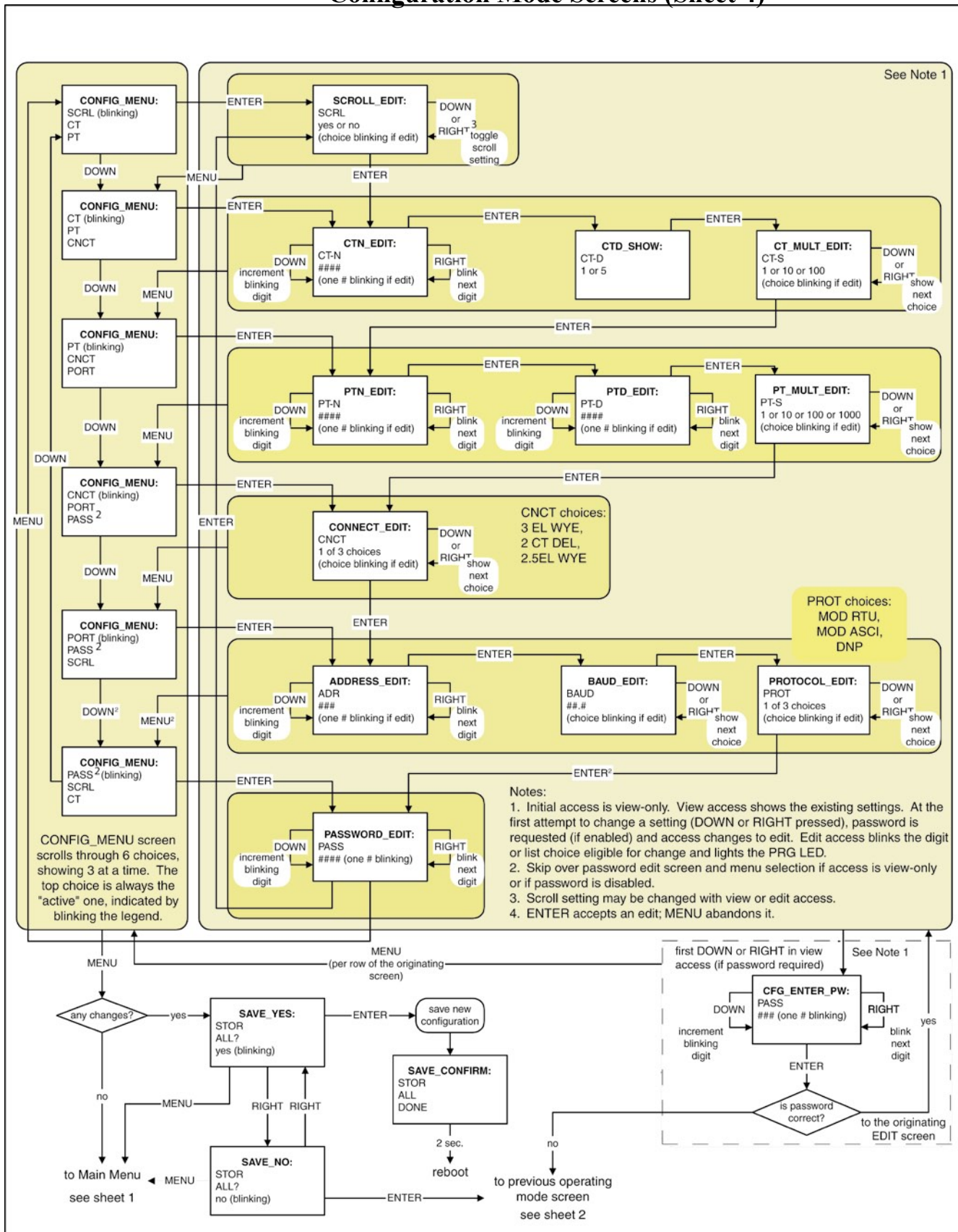
Operating Mode Screens (Sheet 2)



Reset Mode Screens (Sheet 3)



Configuration Mode Screens (Sheet 4)



App. B Modbus Mapping for IQ 250/260

Introduction

The Modbus Map for the IQ 250/260 Meter gives details and information about the possible readings of the meter and its programming. The IQ 250/260 can be programmed using the buttons on the face of the meter (Chapter 6) or with the IQ 250/260 Modbus Configuration Software (Chapter 8).

Modbus Register Map Sections

The IQ 250/260 Modbus Register Map includes the following sections:

Fixed Data Section, Registers 1- 47, details the Meter's Fixed Information.

Meter Data Section, Registers 1000 - 12031, details the Meter's Readings, including Primary Readings, Energy Block, Demand Block, Phase Angle Block, Status Block, THD Block, Minimum and Maximum in Regular and Time Stamp Blocks, Option Card Blocks, and Accumulators. Operating Mode readings are described in Chapter 6 of this manual.

Commands Section, Registers 20000 - 26011, details the Meter's Resets Block, Programming Block, Other Commands Block and Encryption Block.

Programmable Settings Section, Registers 30000 - 33575, details all the setups you can program to configure your meter.

Secondary Readings Section, Registers 40001 - 40100, details the Meter's Secondary Readings.

Data Formats

ASCII: ASCII characters packed 2 per register in high, low order and without any termination characters.

SINT16/UINT16: 16-bit signed/unsigned integer.

SINT32/UINT32: 32-bit signed/unsigned integer spanning 2 registers. The lower-addressed register is the high order half.

FLOAT: 32-bit IEEE floating point number spanning 2 registers. The lower-addressed register is the high order half (i.e., contains the exponent).

Floating Point Values

Floating Point Values are represented in the following format:

Register	0																1															
Byte	0								1								0								1							
Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Meaning	s	e	e	e	e	e	e	e	e	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m
	sign		exponent								mantissa																					

The formula to interpret a Floating Point Value is: $-1^{sign} \times 2^{exponent-127} \times 1.mantissa = 0x0C4E11DB9$
 $-1^{sign} \times 2^{137-127} \times 1.1000010001110110111001$
 $-1 \times 2^{10} \times 1.75871956$
 -1800.929

Register	0x0C4E1																0x01DB9															
Byte	0x0C4								0x0E1								0x01D								0x0B9							
Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
	1	1	0	0	0	1	0	0	1	1	1	0	0	0	0	1	0	0	0	1	1	1	0	1	1	0	1	1	1	0	0	1
Meaning	s	e	e	e	e	e	e	e	e	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	
	sign		exponent						mantissa																							
	1		0x089 + 137						0b011000010001110110111001																							

Formula Explanation:

C4E11DB9 (hex) 11000100 11100001 00011101 10111001 (binary)

The sign of the mantissa (and therefore the number) is 1, which represents a negative value.

The Exponent is 10001001 (binary) or 137 decimal.

The Exponent is a value in excess 127. So, the Exponent value is 10.

The Mantissa is 11000010001110110111001 binary.

With the implied leading 1, the Mantissa is (1).C23B72 (hex).

The Floating Point Representation is therefore -1.75871956 times 2 to the 10.

Decimal equivalent: -1800.929

NOTES:

- Exponent = the whole number before the decimal point.
- Mantissa = the positive fraction after the decimal point.

Modbus Register Map (MM-1 to MM-22)

The IQ 250/260 Modbus Register Map begins on the following page.

Modbus Address		Description1	Format	Range6	Units or Resolution	Comments	# Reg
Hex	Decimal						
Fixed Data Section							
Identification Block						read-only	
0000 - 0007	1 - 8	Reserved	ASCII	16 char	none	Reserved	8
0008 - 000F	9 - 16	Meter Serial Number	ASCII	16 char	none		8
0010 - 0010	17 - 17	Meter Type	UINT16	bit-mapped	-----t -----vvv	t = transducer model (1=yes, 0=no), vvv = IQ Model: V40 = IQ 250 V41 = IQ 260	1
0011 - 0012	18 - 19	Firmware Version	ASCII	4 char	none		2
0013 - 0013	20 - 20	Map Version	UINT16	0 to 65535	none		1
0014 - 0014	21 - 21	Meter Configuration	UINT16	bit-mapped	-----ccc --ffffff	ccc = CT denominator (1 or 5), ffffff = calibration frequency (50 or 60)	1
0015 - 0015	22 - 22	ASIC Version	UINT16	0-65535	none		1
0016 - 0017	23 - 24	Boot Firmware Version	ASCII	4 char	none		2
0018 - 0018	25 - 25	Option Slot 1 Usage	UINT16	bit-mapped	same as register 10000 (0x270F)		1
0019 - 0019	26 - 26	Option Slot 2 Usage	UINT16	bit-mapped	same as register 11000 (0x2AF7)		1
001A - 001D	27 - 30	Meter Type Name	ASCII	8 char	none		4
001E - 0026	31 - 39	Reserved				Reserved	9
0027 - 002E	40 - 47	Reserved				Reserved	8
						Block Size:	47
Meter Data Section2							
Primary Readings Block						read-only	
03E7 - 03E8	1000 - 1001	Volts A-N	FLOAT	0 to 9999 M	volts		2
03E9 - 03EA	1002 - 1003	Volts B-N	FLOAT	0 to 9999 M	volts		2
03EB - 03EC	1004 - 1005	Volts C-N	FLOAT	0 to 9999 M	volts		2
03ED - 03EE	1006 - 1007	Volts A-B	FLOAT	0 to 9999 M	volts		2
03EF - 03F0	1008 - 1009	Volts B-C	FLOAT	0 to 9999 M	volts		2
03F1 - 03F2	1010 - 1011	Volts C-A	FLOAT	0 to 9999 M	volts		2
03F3 - 03F4	1012 - 1013	Amps A	FLOAT	0 to 9999 M	amps		2
03F5 - 03F6	1014 - 1015	Amps B	FLOAT	0 to 9999 M	amps		2
03F7 - 03F8	1016 - 1017	Amps C	FLOAT	0 to 9999 M	amps		2
03F9 - 03FA	1018 - 1019	Watts, 3-Ph total	FLOAT	-9999 M to +9999 M	watts		2
03FB - 03FC	1020 - 1021	VARs, 3-Ph total	FLOAT	-9999 M to +9999 M	VARs		2
03FD - 03FE	1022 - 1023	VAs, 3-Ph total	FLOAT	-9999 M to +9999 M	VAs		2
03FF - 0400	1024 - 1025	Power Factor, 3-Ph total	FLOAT	-1.00 to +1.00	none		2
0401 - 0402	1026 - 1027	Frequency	FLOAT	0 to 65.00	Hz		2
0403 - 0404	1028 - 1029	Neutral Current	FLOAT	0 to 9999 M	amps		2
0405 - 0406	1030 - 1031	Watts, Phase A	FLOAT	-9999 M to +9999 M	watts		2
0407 - 0408	1032 - 1033	Watts, Phase B	FLOAT	-9999 M to +9999 M	watts		2
0409 - 040A	1034 - 1035	Watts, Phase C	FLOAT	-9999 M to +9999 M	watts		2
040B - 040C	1036 - 1037	VARs, Phase A	FLOAT	-9999 M to +9999 M	VARs		2
040D - 040E	1038 - 1039	VARs, Phase B	FLOAT	-9999 M to +9999 M	VARs		2
040F - 0410	1040 - 1041	VARs, Phase C	FLOAT	-9999 M to +9999 M	VARs		2

0411 - 0412	1042 - 1043	VAs, Phase A	FLOAT	-9999 M to +9999 M	VAs		2
0413 - 0414	1044 - 1045	VAs, Phase B	FLOAT	-9999 M to +9999 M	VAs		2
0415 - 0416	1046 - 1047	VAs, Phase C	FLOAT	-9999 M to +9999 M	VAs		2
0417 - 0418	1048 - 1049	Power Factor, Phase A	FLOAT	-1.00 to +1.00	none		2
0419 - 041A	1050 - 1051	Power Factor, Phase B	FLOAT	-1.00 to +1.00	none		2
041B - 041C	1052 - 1053	Power Factor, Phase C	FLOAT	-1.00 to +1.00	none		2
041D - 0425	1054 - 1062	Reserved				Reserved	9
						Block Size:	63
Primary Energy Block						read-only	
05DB - 05DC	1500 - 1501	W-hours, Received	SINT32	0 to 99999999 or 0 to -99999999	Wh per energy format	* Wh received & delivered always have opposite signs	2
05DD - 05DE	1502 - 1503	W-hours, Delivered	SINT32	0 to 99999999 or 0 to -99999999	Wh per energy format	* Wh received is positive for "view as load", delivered is positive for "view as generator"	2
05DF - 05E0	1504 - 1505	W-hours, Net	SINT32	-99999999 to 99999999	Wh per energy format	* 5 to 8 digits	2
05E1 - 05E2	1506 - 1507	W-hours, Total	SINT32	0 to 99999999	Wh per energy format	* decimal point implied, per energy format	2
05E3 - 05E4	1508 - 1509	VAR-hours, Positive	SINT32	0 to 99999999	VARh per energy format		2
05E5 - 05E6	1510 - 1511	VAR-hours, Negative	SINT32	0 to -99999999	VARh per energy format	* resolution of digit before decimal point = units, kilo, or mega, per energy format	2
05E7 - 05E8	1512 - 1513	VAR-hours, Net	SINT32	-99999999 to 99999999	VARh per energy format		2
05E9 - 05EA	1514 - 1515	VAR-hours, Total	SINT32	0 to 99999999	VARh per energy format	* see note 10	2
05EB - 05EC	1516 - 1517	VA-hours, Total	SINT32	0 to 99999999	VAh per energy format		2
05ED - 05EE	1518 - 1519	W-hours, Received, Phase A	SINT32	0 to 99999999 or 0 to -99999999	Wh per energy format		2
05EF - 05F0	1520 - 1521	W-hours, Received, Phase B	SINT32	0 to 99999999 or 0 to -99999999	Wh per energy format		2
05F1 - 05F2	1522 - 1523	W-hours, Received, Phase C	SINT32	0 to 99999999 or 0 to -99999999	Wh per energy format		2
05F3 - 05F4	1524 - 1525	W-hours, Delivered, Phase A	SINT32	0 to 99999999 or 0 to -99999999	Wh per energy format		2
05F5 - 05F6	1526 - 1527	W-hours, Delivered, Phase B	SINT32	0 to 99999999 or 0 to -99999999	Wh per energy format		2
05F7 - 05F8	1528 - 1529	W-hours, Delivered, Phase C	SINT32	0 to 99999999 or 0 to -99999999	Wh per energy format		2
05F9 - 05FA	1530 - 1531	W-hours, Net, Phase A	SINT32	-99999999 to 99999999	Wh per energy format		2
05FB - 05FC	1532 - 1533	W-hours, Net, Phase B	SINT32	-99999999 to 99999999	Wh per energy format		2
05FD - 05FE	1534 - 1535	W-hours, Net, Phase C	SINT32	-99999999 to 99999999	Wh per energy format		2
05FF - 0600	1536 - 1537	W-hours, Total, Phase A	SINT32	0 to 99999999	Wh per energy format		2
0601 - 0602	1538 - 1539	W-hours, Total, Phase B	SINT32	0 to 99999999	Wh per energy format		2
0603 - 0604	1540 - 1541	W-hours, Total, Phase C	SINT32	0 to 99999999	Wh per energy format		2
0605 - 0606	1542 - 1543	VAR-hours, Positive, Phase A	SINT32	0 to 99999999	VARh per energy format		2
0607 - 0608	1544 - 1545	VAR-hours, Positive, Phase B	SINT32	0 to 99999999	VARh per energy format		2
0609 - 060A	1546 - 1547	VAR-hours, Positive, Phase C	SINT32	0 to 99999999	VARh per energy format		2
060B - 060C	1548 - 1549	VAR-hours, Negative, Phase A	SINT32	0 to -99999999	VARh per energy format		2
060D - 060E	1550 - 1551	VAR-hours, Negative, Phase B	SINT32	0 to -99999999	VARh per energy format		2
060F - 0610	1552 - 1553	VAR-hours, Negative, Phase C	SINT32	0 to -99999999	VARh per energy format		2



IQ 250/260 Meter

Appendix B:
Modbus Mapping

0611 - 0612	1554 - 1555	VAR-hours, Net, Phase A	SINT32	-99999999 to 99999999	VARh per energy format	Block Size:	2
0613 - 0614	1556 - 1557	VAR-hours, Net, Phase B	SINT32	-99999999 to 99999999	VARh per energy format		2
0615 - 0616	1558 - 1559	VAR-hours, Net, Phase C	SINT32	-99999999 to 99999999	VARh per energy format		2
0617 - 0618	1560 - 1561	VAR-hours, Total, Phase A	SINT32	0 to 99999999	VARh per energy format		2
0619 - 061A	1562 - 1563	VAR-hours, Total, Phase B	SINT32	0 to 99999999	VARh per energy format		2
061B - 061C	1564 - 1565	VAR-hours, Total, Phase C	SINT32	0 to 99999999	VARh per energy format		2
061D - 061E	1566 - 1567	VA-hours, Phase A	SINT32	0 to 99999999	VAh per energy format		2
061F - 0620	1568 - 1569	VA-hours, Phase B	SINT32	0 to 99999999	VAh per energy format		2
0621 - 0622	1570 - 1571	VA-hours, Phase C	SINT32	0 to 99999999	VAh per energy format		2
Primary Demand Block						read-only	
07CF - 07D0	2000 - 2001	Amps A, Average	FLOAT	0 to 9999 M	amps		2
07D1 - 07D2	2002 - 2003	Amps B, Average	FLOAT	0 to 9999 M	amps		2
07D3 - 07D4	2004 - 2005	Amps C, Average	FLOAT	0 to 9999 M	amps		2
07D5 - 07D6	2006 - 2007	Positive Watts, 3-Ph, Average	FLOAT	-9999 M to +9999 M	watts		2
07D7 - 07D8	2008 - 2009	Positive VARs, 3-Ph, Average	FLOAT	-9999 M to +9999 M	VARs		2
07D9 - 07DA	2010 - 2011	Negative Watts, 3-Ph, Average	FLOAT	-9999 M to +9999 M	watts		2
07DB - 07DC	2012 - 2013	Negative VARs, 3-Ph, Average	FLOAT	-9999 M to +9999 M	VARs		2
07DD - 07DE	2014 - 2015	VAs, 3-Ph, Average	FLOAT	-9999 M to +9999 M	VAs		2
07DF - 07E0	2016 - 2017	Positive PF, 3-Ph, Average	FLOAT	-1.00 to +1.00	none		2
07E1 - 07E2	2018 - 2019	Negative PF, 3-PF, Average	FLOAT	-1.00 to +1.00	none		2
07E3 - 07E4	2020 - 2021	Neutral Current, Average	FLOAT	0 to 9999 M	amps		2
07E5 - 07E6	2022 - 2023	Positive Watts, Phase A, Average	FLOAT	-9999 M to +9999 M	watts		2
07E7 - 07E8	2024 - 2025	Positive Watts, Phase B, Average	FLOAT	-9999 M to +9999 M	watts		2
07E9 - 07EA	2026 - 2027	Positive Watts, Phase C, Average	FLOAT	-9999 M to +9999 M	watts		2
07EB - 07EC	2028 - 2029	Positive VARs, Phase A, Average	FLOAT	-9999 M to +9999 M	VARs		2
07ED - 07EE	2030 - 2031	Positive VARs, Phase B, Average	FLOAT	-9999 M to +9999 M	VARs		2
07EF - 07F0	2032 - 2033	Positive VARs, Phase C, Average	FLOAT	-9999 M to +9999 M	VARs		2
07F1 - 07F2	2034 - 2035	Negative Watts, Phase A, Average	FLOAT	-9999 M to +9999 M	watts		2
07F3 - 07F4	2036 - 2037	Negative Watts, Phase B, Average	FLOAT	-9999 M to +9999 M	watts		2
07F5 - 07F6	2038 - 2039	Negative Watts, Phase C, Average	FLOAT	-9999 M to +9999 M	watts		2
07F7 - 07F8	2040 - 2041	Negative VARs, Phase A, Average	FLOAT	-9999 M to +9999 M	VARs		2
07F9 - 07FA	2042 - 2043	Negative VARs, Phase B, Average	FLOAT	-9999 M to +9999 M	VARs		2
07FB - 07FC	2044 - 2045	Negative VARs, Phase C, Average	FLOAT	-9999 M to +9999 M	VARs		2
07FD - 07FE	2046 - 2047	VAs, Phase A, Average	FLOAT	-9999 M to +9999 M	VAs		2
07FF - 0800	2048 - 2049	VAs, Phase B, Average	FLOAT	-9999 M to +9999 M	VAs		2
0801 - 0802	2050 - 2051	VAs, Phase C, Average	FLOAT	-9999 M to +9999 M	VAs		2
0803 - 0804	2052 - 2053	Positive PF, Phase A, Average	FLOAT	-1.00 to +1.00	none		2
0805 - 0806	2054 - 2055	Positive PF, Phase B, Average	FLOAT	-1.00 to +1.00	none		2
0807 - 0808	2056 - 2057	Positive PF, Phase C, Average	FLOAT	-1.00 to +1.00	none		2
0809 - 080A	2058 - 2059	Negative PF, Phase A, Average	FLOAT	-1.00 to +1.00	none		2
080B - 080C	2060 - 2061	Negative PF, Phase B, Average	FLOAT	-1.00 to +1.00	none		2
080D - 080E	2062 - 2063	Negative PF, Phase C, Average	FLOAT	-1.00 to +1.00	none		2
						Block Size:	64

Phase Angle Block						read-only	
1003 - 1003	4100 - 4100	Phase A Current	SINT16	-1800 to +1800	0.1 degree		1
1004 - 1004	4101 - 4101	Phase B Current	SINT16	-1800 to +1800	0.1 degree		1
1005 - 1005	4102 - 4102	Phase C Current	SINT16	-1800 to +1800	0.1 degree		1
1006 - 1006	4103 - 4103	Angle, Volts A-B	SINT16	-1800 to +1800	0.1 degree		1
1007 - 1007	4104 - 4104	Angle, Volts B-C	SINT16	-1800 to +1800	0.1 degree		1
1008 - 1008	4105 - 4105	Angle, Volts C-A	SINT16	-1800 to +1800	0.1 degree		1
						Block Size:	6
Status Block						read-only	
1193 - 1193	4500 - 4500	Port ID	UINT16	1 to 4	none	Identifies which IQ 250/260 COM port a master is connected to: 2 for COM2, etc. See chapter 5 for COM port assignments.	1
1194 - 1194	4501 - 4501	Meter Status	UINT16	bit-mapped	mmmpch-- -ffeeccc	mmm = measurement state (0=off, 1=running normally, 2=limp mode, 3=warmup, 6&7=boot, others unused) See note 16. pch = NVMEM block OK flags (p=profile, c=calibration, h=header), flag is 1 if OK ff = flash state (0=initializing, 1=logging disabled by Vswitch, 3=logging) ee = edit state (0=startup, 1=normal, 2=privileged command session, 3=profile update mode) ccc = port enabled for edit(0=none, 1-4=COM1-COM4, 7=front panel)	1
1195 - 1195	4502 - 4502	Limits Status	UINT16	bit-mapped	87654321 87654321	High byte is setpt 1, 0=in, 1=out low byte is setpt 2, 0=in, 1=out see notes 11, 12, 17	1
1196 - 1197	4503 - 4504	Time Since Reset	UINT32	0 to 4294967294	4 msec	Wraps around after max count.	2
1198 - 119A	4505 - 4507	Meter On Time	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
119B - 119D	4508 - 4510	Current Date and Time	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
119E - 119E	4511 - 4511	Reserved				Reserved	1
119F - 119F	4512 - 4512	Current Day of Week	UINT16	1 to 7	1 day	1=Sun, 2=Mon, etc.	1
						Block Size:	13
THD Block13						read-only	
176F - 176F	6000 - 6000	Volts A-N, %THD	UINT16	0 to 10000	0.01%		1
1770 - 1770	6001 - 6001	Volts B-N, %THD	UINT16	0 to 10000	0.01%		1
1771 - 1771	6002 - 6002	Volts C-N, %THD	UINT16	0 to 10000	0.01%		1
1772 - 1772	6003 - 6003	Amps A, %THD	UINT16	0 to 10000	0.01%		1
1773 - 1773	6004 - 6004	Amps B, %THD	UINT16	0 to 10000	0.01%		1
1774 - 1774	6005 - 6005	Amps C, %THD	UINT16	0 to 10000	0.01%		1
1775 - 179C	6006 - 6045	Phase A Voltage harmonic magnitudes	UINT16	0 to 10000	0.01%	In each group of 40 registers, the first register represents the fundamental frequency or first harmonic, the second represents the second harmonic, and so on up to the 40th register which represents the 40th harmonic.	40
179D - 17C4	6046 - 6085	Phase A Voltage harmonic phases	SINT16	-1800 to +1800	0.1 degree		40
17C5 - 17EC	6086 - 6125	Phase A Current harmonic magnitudes	UINT16	0 to 10000	0.01%		40
17ED - 1814	6126 - 6165	Phase A Current harmonic phases	SINT16	-1800 to +1800	0.1 degree		40
1815 - 183C	6166 - 6205	Phase B Voltage harmonic magnitudes	UINT16	0 to 10000	0.01%	Harmonic magnitudes are given as % of the fundamental magnitude. Thus the first register in each group of 40 will typically be 9999. A reading of 10000 indicates invalid.	40
183D - 1864	6206 - 6245	Phase B Voltage harmonic phases	SINT16	-1800 to +1800	0.1 degree		40
1865 - 188C	6246 - 6285	Phase B Current harmonic magnitudes	UINT16	0 to 10000	0.01%		40
188D - 18B4	6286 - 6325	Phase B Current harmonic phases	SINT16	-1800 to +1800	0.1 degree		40
18B5 - 18DC	6326 - 6365	Phase C Voltage harmonic magnitudes	UINT16	0 to 10000	0.01%		40
							40

18DD - 1904	6366 - 6405	Phase C Voltage harmonic phases	SINT16	-1800 to +1800	0.1 degree		40
1905 - 192C	6406 - 6445	Phase C Current harmonic magnitudes	UINT16	0 to 10000	0.01%		40
192D - 1954	6446 - 6485	Phase C Current harmonic phases	SINT16	-1800 to +1800	0.1 degree		40
1955 - 1955	6486 - 6486	Wave Scope scale factor for channel Va	UINT16	0 to 32767		Convert individual samples to volts or amps: V or A = (sample * scale factor) / 1,000,000	1
1956 - 1956	6487 - 6487	Wave Scope scale factors for channel Ib	UINT16	0 to 32767			1
1957 - 1958	6488 - 6489	Wave Scope scale factors for channels Vb and Ib	UINT16	0 to 32767			2
1959 - 195A	6490 - 6491	Wave Scope scale factors for channels Vc and Ic	UINT16	0 to 32767		Samples update in conjunction with THD and harmonics; samples not available (all zeroes) if THD not available.	2
195B - 199A	6492 - 6555	Wave Scope samples for channel Va	SINT16	-32768 to +32767			64
199B - 19DA	6556 - 6619	Wave Scope samples for channel Vb	SINT16	-32768 to +32767			64
19DB - 1A1A	6620 - 6683	Wave Scope samples for channel Vc	SINT16	-32768 to +32767			64
1A1B - 1A5A	6684 - 6747	Wave Scope samples for channel Ia	SINT16	-32768 to +32767			64
1A5B - 1A9A	6748 - 6811	Wave Scope samples for channel Ib	SINT16	-32768 to +32767			64
1A9B - 1ADA	6812 - 6875	Wave Scope samples for channel Ic	SINT16	-32768 to +32767			64
						Block Size:	876
Primary Minimum Block						read-only	
1F3F - 1F40	8000 - 8001	Volts A-N, Minimum	FLOAT	0 to 9999 M	volts		2
1F41 - 1F42	8002 - 8003	Volts B-N, Minimum	FLOAT	0 to 9999 M	volts		2
1F43 - 1F44	8004 - 8005	Volts C-N, Minimum	FLOAT	0 to 9999 M	volts		2
1F45 - 1F46	8006 - 8007	Volts A-B, Minimum	FLOAT	0 to 9999 M	volts		2
1F47 - 1F48	8008 - 8009	Volts B-C, Minimum	FLOAT	0 to 9999 M	volts		2
1F49 - 1F4A	8010 - 8011	Volts C-A, Minimum	FLOAT	0 to 9999 M	volts		2
1F4B - 1F4C	8012 - 8013	Amps A, Minimum Avg Demand	FLOAT	0 to 9999 M	amps		2
1F4D - 1F4E	8014 - 8015	Amps B, Minimum Avg Demand	FLOAT	0 to 9999 M	amps		2
1F4F - 1F50	8016 - 8017	Amps C, Minimum Avg Demand	FLOAT	0 to 9999 M	amps		2
1F51 - 1F52	8018 - 8019	Positive Watts, 3-Ph, Minimum Avg Demand	FLOAT	0 to +9999 M	watts		2
1F53 - 1F54	8020 - 8021	Positive VARs, 3-Ph, Minimum Avg Demand	FLOAT	0 to +9999 M	VARs		2
1F55 - 1F56	8022 - 8023	Negative Watts, 3-Ph, Minimum Avg Demand	FLOAT	0 to +9999 M	watts		2
1F57 - 1F58	8024 - 8025	Negative VARs, 3-Ph, Minimum Avg Demand	FLOAT	0 to +9999 M	VARs		2
1F59 - 1F5A	8026 - 8027	VAs, 3-Ph, Minimum Avg Demand	FLOAT	-9999 M to +9999 M	VAs		2
1F5B - 1F5C	8028 - 8029	Positive Power Factor, 3-Ph, Minimum Avg Demand	FLOAT	-1.00 to +1.00	none		2
1F5D - 1F5E	8030 - 8031	Negative Power Factor, 3-Ph, Minimum Avg Demand	FLOAT	-1.00 to +1.00	none		2
1F5F - 1F60	8032 - 8033	Frequency, Minimum	FLOAT	0 to 65.00	Hz		2
1F61 - 1F62	8034 - 8035	Neutral Current, Minimum Avg Demand	FLOAT	0 to 9999 M	amps		2
1F63 - 1F64	8036 - 8037	Positive Watts, Phase A, Minimum Avg Demand	FLOAT	-9999 M to +9999 M	watts		2
1F65 - 1F66	8038 - 8039	Positive Watts, Phase B, Minimum Avg Demand	FLOAT	-9999 M to +9999 M	watts		2
1F67 - 1F68	8040 - 8041	Positive Watts, Phase C, Minimum Avg Demand	FLOAT	-9999 M to +9999 M	watts		2
1F69 - 1F6A	8042 - 8043	Positive VARs, Phase A, Minimum Avg Demand	FLOAT	-9999 M to +9999 M	VARs		2
1F6B - 1F6C	8044 - 8045	Positive VARs, Phase B, Minimum Avg Demand	FLOAT	-9999 M to +9999 M	VARs		2

1F6D - 1F6E	8046 - 8047	Positive VARs, Phase C, Minimum Avg Demand	FLOAT	-9999 M to +9999 M	VARs		2
1F6F - 1F70	8048 - 8049	Negative Watts, Phase A, Minimum Avg Demand	FLOAT	-9999 M to +9999 M	watts		2
1F71 - 1F72	8050 - 8051	Negative Watts, Phase B, Minimum Avg Demand	FLOAT	-9999 M to +9999 M	watts		2
1F73 - 1F74	8052 - 8053	Negative Watts, Phase C, Minimum Avg Demand	FLOAT	-9999 M to +9999 M	watts		2
1F75 - 1F76	8054 - 8055	Negative VARs, Phase A, Minimum Avg Demand	FLOAT	-9999 M to +9999 M	VARs		2
1F77 - 1F78	8056 - 8057	Negative VARs, Phase B, Minimum Avg Demand	FLOAT	-9999 M to +9999 M	VARs		2
1F79 - 1F7A	8058 - 8059	Negative VARs, Phase C, Minimum Avg Demand	FLOAT	-9999 M to +9999 M	VARs		2
1F7B - 1F7C	8060 - 8061	VAs, Phase A, Minimum Avg Demand	FLOAT	-9999 M to +9999 M	VAs		2
1F7D - 1F7E	8062 - 8063	VAs, Phase B, Minimum Avg Demand	FLOAT	-9999 M to +9999 M	VAs		2
1F7F - 1F80	8064 - 8065	VAs, Phase C, Minimum Avg Demand	FLOAT	-9999 M to +9999 M	VAs		2
1F81 - 1F82	8066 - 8067	Positive PF, Phase A, Minimum Avg Demand	FLOAT	-1.00 to +1.00	none		2
1F83 - 1F84	8068 - 8069	Positive PF, Phase B, Minimum Avg Demand	FLOAT	-1.00 to +1.00	none		2
1F85 - 1F86	8070 - 8071	Positive PF, Phase C, Minimum Avg Demand	FLOAT	-1.00 to +1.00	none		2
1F87 - 1F88	8072 - 8073	Negative PF, Phase A, Minimum Avg Demand	FLOAT	-1.00 to +1.00	none		2
1F89 - 1F8A	8074 - 8075	Negative PF, Phase B, Minimum Avg Demand	FLOAT	-1.00 to +1.00	none		2
1F8B - 1F8C	8076 - 8077	Negative PF, Phase C, Minimum Avg Demand	FLOAT	-1.00 to +1.00	none		2
1F8D - 1F8D	8078 - 8078	Volts A-N, %THD, Minimum	UINT16	0 to 9999	0.01%		1
1F8E - 1F8E	8079 - 8079	Volts B-N, %THD, Minimum	UINT16	0 to 9999	0.01%		1
1F8F - 1F8F	8080 - 8080	Volts C-N, %THD, Minimum	UINT16	0 to 9999	0.01%		1
1F90 - 1F90	8081 - 8081	Amps A, %THD, Minimum	UINT16	0 to 9999	0.01%		1
1F91 - 1F91	8082 - 8082	Amps B, %THD, Minimum	UINT16	0 to 9999	0.01%		1
1F92 - 1F92	8083 - 8083	Amps C, %THD, Minimum	UINT16	0 to 9999	0.01%		1
1F93 - 1F9B	8084 - 8092	Reserved				Reserved	9
						Block Size:	93
Primary Minimum Timestamp Block						read-only	
20CF - 20D1	8400 - 8402	Volts A-N, Min Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
20D2 - 20D4	8403 - 8405	Volts B-N, Min Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
20D5 - 20D7	8406 - 8408	Volts C-N, Min Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
20D8 - 20DA	8409 - 8411	Volts A-B, Min Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
20DB - 20DD	8412 - 8414	Volts B-C, Min Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
20DE - 20E0	8415 - 8417	Volts C-A, Min Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
20E1 - 20E3	8418 - 8420	Amps A, Min Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
20E4 - 20E6	8421 - 8423	Amps B, Min Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
20E7 - 20E9	8424 - 8426	Amps C, Min Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
20EA - 20EC	8427 - 8429	Positive Watts, 3-Ph, Min Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
20ED - 20EF	8430 - 8432	Positive VARs, 3-Ph, Min Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
20F0 - 20F2	8433 - 8435	Negative Watts, 3-Ph, Min Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
20F3 - 20F5	8436 - 8438	Negative VARs, 3-Ph, Min Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
20F6 - 20F8	8439 - 8441	VAs, 3-Ph, Min Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3

20F9 - 20FB	8442 - 8444	Positive Power Factor, 3-Ph, Min Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
20FC - 20FE	8445 - 8447	Negative Power Factor, 3-Ph, Min Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
20FF - 2101	8448 - 8450	Frequency, Min Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
2102 - 2104	8451 - 8453	Neutral Current, Min Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2100	2 sec		3
2105 - 2107	8454 - 8456	Positive Watts, Phase A, Min Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
2108 - 210A	8457 - 8459	Positive Watts, Phase B, Min Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
210B - 210D	8460 - 8462	Positive Watts, Phase C, Min Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
210E - 2110	8463 - 8465	Positive VARs, Phase A, Min Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
2111 - 2113	8466 - 8468	Positive VARs, Phase B, Min Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
2114 - 2116	8469 - 8471	Positive VARs, Phase C, Min Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
2117 - 2119	8472 - 8474	Negative Watts, Phase A, Min Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
211A - 211C	8475 - 8477	Negative Watts, Phase B, Min Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
211D - 211F	8478 - 8480	Negative Watts, Phase C, Min Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
2120 - 2122	8481 - 8483	Negative VARs, Phase A, Min Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
2123 - 2125	8484 - 8486	Negative VARs, Phase B, Min Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
2126 - 2128	8487 - 8489	Negative VARs, Phase C, Min Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
2129 - 212B	8490 - 8492	VAs, Phase A, Min Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
212C - 212E	8493 - 8495	VAs, Phase B, Min Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
212F - 2131	8496 - 8498	VAs, Phase C, Min Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
2132 - 2134	8499 - 8501	Positive PF, Phase A, Min Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
2135 - 2137	8502 - 8504	Positive PF, Phase B, Min Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
2138 - 213A	8505 - 8507	Positive PF, Phase C, Min Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
213B - 213D	8508 - 8510	Negative PF, Phase A, Min Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
213E - 2140	8511 - 8513	Negative PF, Phase B, Min Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
2141 - 2143	8514 - 8516	Negative PF, Phase C, Min Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
2144 - 2146	8517 - 8519	Volts A-N, %THD, Min Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
2147 - 2149	8520 - 8522	Volts B-N, %THD, Min Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
214A - 214C	8523 - 8525	Volts C-N, %THD, Min Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
214D - 214F	8526 - 8528	Amps A, %THD, Min Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
2150 - 2152	8529 - 8531	Amps B, %THD, Min Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
2153 - 2155	8532 - 8534	Amps C, %THD, Min Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
2156 - 2167	8535 - 8552	Reserved				Reserved	18
						Block Size:	153

Primary Maximum Block						read-only	
2327 - 2328	9000 - 9001	Volts A-N, Maximum	FLOAT	0 to 9999 M	volts		2
2329 - 232A	9002 - 9003	Volts B-N, Maximum	FLOAT	0 to 9999 M	volts		2
232B - 232C	9004 - 9005	Volts C-N, Maximum	FLOAT	0 to 9999 M	volts		2
232D - 232E	9006 - 9007	Volts A-B, Maximum	FLOAT	0 to 9999 M	volts		2
232F - 2330	9008 - 9009	Volts B-C, Maximum	FLOAT	0 to 9999 M	volts		2
2331 - 2332	9010 - 9011	Volts C-A, Maximum	FLOAT	0 to 9999 M	volts		2
2333 - 2334	9012 - 9013	Amps A, Maximum Avg Demand	FLOAT	0 to 9999 M	amps		2
2335 - 2336	9014 - 9015	Amps B, Maximum Avg Demand	FLOAT	0 to 9999 M	amps		2
2337 - 2338	9016 - 9017	Amps C, Maximum Avg Demand	FLOAT	0 to 9999 M	amps		2
2339 - 233A	9018 - 9019	Positive Watts, 3-Ph, Maximum Avg Demand	FLOAT	0 to +9999 M	watts		2
233B - 233C	9020 - 9021	Positive VARs, 3-Ph, Maximum Avg Demand	FLOAT	0 to +9999 M	VARs		2
233D - 233E	9022 - 9023	Negative Watts, 3-Ph, Maximum Avg Demand	FLOAT	0 to +9999 M	watts		2
233F - 2340	9024 - 9025	Negative VARs, 3-Ph, Maximum Avg Demand	FLOAT	0 to +9999 M	VARs		2
2341 - 2342	9026 - 9027	VAs, 3-Ph, Maximum Avg Demand	FLOAT	-9999 M to +9999 M	VAs		2
2343 - 2344	9028 - 9029	Positive Power Factor, 3-Ph, Maximum Avg Demand	FLOAT	-1.00 to +1.00	none		2
2345 - 2346	9030 - 9031	Negative Power Factor, 3-Ph, Maximum Avg Demand	FLOAT	-1.00 to +1.00	none		2
2347 - 2348	9032 - 9033	Frequency, Maximum	FLOAT	0 to 65.00	Hz		2
2349 - 234A	9034 - 9035	Neutral Current, Maximum Avg Demand	FLOAT	0 to 9999 M	amps		2
234B - 234C	9036 - 9037	Positive Watts, Phase A, Maximum Avg Demand	FLOAT	-9999 M to +9999 M	watts		2
234D - 234E	9038 - 9039	Positive Watts, Phase B, Maximum Avg Demand	FLOAT	-9999 M to +9999 M	watts		2
234F - 2350	9040 - 9041	Positive Watts, Phase C, Maximum Avg Demand	FLOAT	-9999 M to +9999 M	watts		2
2351 - 2352	9042 - 9043	Positive VARs, Phase A, Maximum Avg Demand	FLOAT	-9999 M to +9999 M	VARs		2
2353 - 2354	9044 - 9045	Positive VARs, Phase B, Maximum Avg Demand	FLOAT	-9999 M to +9999 M	VARs		2
2355 - 2356	9046 - 9047	Positive VARs, Phase C, Maximum Avg Demand	FLOAT	-9999 M to +9999 M	VARs		2
2357 - 2358	9048 - 9049	Negative Watts, Phase A, Maximum Avg Demand	FLOAT	-9999 M to +9999 M	watts		2
2359 - 235A	9050 - 9051	Negative Watts, Phase B, Maximum Avg Demand	FLOAT	-9999 M to +9999 M	watts		2
235B - 235C	9052 - 9053	Negative Watts, Phase C, Maximum Avg Demand	FLOAT	-9999 M to +9999 M	watts		2
235D - 235E	9054 - 9055	Negative VARs, Phase A, Maximum Avg Demand	FLOAT	-9999 M to +9999 M	VARs		2
235F - 2360	9056 - 9057	Negative VARs, Phase B, Maximum Avg Demand	FLOAT	-9999 M to +9999 M	VARs		2
2361 - 2362	9058 - 9059	Negative VARs, Phase C, Maximum Avg Demand	FLOAT	-9999 M to +9999 M	VARs		2
2363 - 2364	9060 - 9061	VAs, Phase A, Maximum Avg Demand	FLOAT	-9999 M to +9999 M	VAs		2
2365 - 2366	9062 - 9063	VAs, Phase B, Maximum Avg Demand	FLOAT	-9999 M to +9999 M	VAs		2
2367 - 2368	9064 - 9065	VAs, Phase C, Maximum Avg Demand	FLOAT	-9999 M to +9999 M	VAs		2
2369 - 236A	9066 - 9067	Positive PF, Phase A, Maximum Avg Demand	FLOAT	-1.00 to +1.00	none		2
236B - 236C	9068 - 9069	Positive PF, Phase B, Maximum Avg Demand	FLOAT	-1.00 to +1.00	none		2

236D - 236E	9070 - 9071	Positive PF, Phase C, Maximum Avg Demand	FLOAT	-1.00 to +1.00	none		2
236F - 2370	9072 - 9073	Negative PF, Phase A, Maximum Avg Demand	FLOAT	-1.00 to +1.00	none		2
2371 - 2372	9074 - 9075	Negative PF, Phase B, Maximum Avg Demand	FLOAT	-1.00 to +1.00	none		2
2373 - 2374	9076 - 9077	Negative PF, Phase C, Maximum Avg Demand	FLOAT	-1.00 to +1.00	none		2
2375 - 2375	9078 - 9078	Volts A-N, %THD, Maximum	UINT16	0 to 9999	0.01%		1
2376 - 2376	9079 - 9079	Volts B-N, %THD, Maximum	UINT16	0 to 9999	0.01%		1
2377 - 2377	9080 - 9080	Volts C-N, %THD, Maximum	UINT16	0 to 9999	0.01%		1
2378 - 2378	9081 - 9081	Amps A, %THD, Maximum	UINT16	0 to 9999	0.01%		1
2379 - 2379	9082 - 9082	Amps B, %THD, Maximum	UINT16	0 to 9999	0.01%		1
237A - 237A	9083 - 9083	Amps C, %THD, Maximum	UINT16	0 to 9999	0.01%		1
237B - 2383	9084 - 9092	Reserved				Reserved	9
						Block Size:	93
Primary Maximum Timestamp Block						read-only	
24B7 - 24B9	9400 - 9402	Volts A-N, Max Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
24BA - 24BC	9403 - 9405	Volts B-N, Max Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
24BD - 24BF	9406 - 9408	Volts C-N, Max Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
24C0 - 24C2	9409 - 9411	Volts A-B, Max Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
24C3 - 24C5	9412 - 9414	Volts B-C, Max Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
24C6 - 24C8	9415 - 9417	Volts C-A, Max Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
24C9 - 24CB	9418 - 9420	Amps A, Max Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
24CC - 24CE	9421 - 9423	Amps B, Max Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
24CF - 24D1	9424 - 9426	Amps C, Max Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
24D2 - 24D4	9427 - 9429	Positive Watts, 3-Ph, Max Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
24D5 - 24D7	9430 - 9432	Positive VARs, 3-Ph, Max Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
24D8 - 24DA	9433 - 9435	Negative Watts, 3-Ph, Max Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
24DB - 24DD	9436 - 9438	Negative VARs, 3-Ph, Max Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
24DE - 24E0	9439 - 9441	VAs, 3-Ph, Max Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
24E1 - 24E3	9442 - 9444	Positive Power Factor, 3-Ph, Max Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
24E4 - 24E6	9445 - 9447	Negative Power Factor, 3-Ph, Max Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
24E7 - 24E9	9448 - 9450	Frequency, Max Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
24EA - 24EC	9451 - 9453	Neutral Current, Max Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2100	1 sec		3
24ED - 24EF	9454 - 9456	Positive Watts, Phase A, Max Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
24F0 - 24F2	9457 - 9459	Positive Watts, Phase B, Max Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
24F3 - 24F5	9460 - 9462	Positive Watts, Phase C, Max Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
24F6 - 24F8	9463 - 9465	Positive VARs, Phase A, Max Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
24F9 - 24FB	9466 - 9468	Positive VARs, Phase B, Max Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3

24FC - 24FE	9469 - 9471	Positive VARs, Phase C, Max Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
24FF - 2501	9472 - 9474	Negative Watts, Phase A, Max Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
2502 - 2504	9475 - 9477	Negative Watts, Phase B, Max Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
2505 - 2507	9478 - 9480	Negative Watts, Phase C, Max Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
2508 - 250A	9481 - 9483	Negative VARs, Phase A, Max Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
250B - 250D	9484 - 9486	Negative VARs, Phase B, Max Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
250E - 2510	9487 - 9489	Negative VARs, Phase C, Max Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
2511 - 2513	9490 - 9492	VAs, Phase A, Max Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
2514 - 2516	9493 - 9495	VAs, Phase B, Max Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
2517 - 2519	9496 - 9498	VAs, Phase C, Max Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
251A - 251C	9499 - 9501	Positive PF, Phase A, Max Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
251D - 251F	9502 - 9504	Positive PF, Phase B, Max Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
2520 - 2522	9505 - 9507	Positive PF, Phase C, Max Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
2523 - 2525	9508 - 9510	Negative PF, Phase A, Max Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
2526 - 2528	9511 - 9513	Negative PF, Phase B, Max Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
2529 - 252B	9514 - 9516	Negative PF, Phase C, Max Avg Dmd Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
252C - 252E	9517 - 9519	Volts A-N, %THD, Max Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
252F - 2531	9520 - 9522	Volts B-N, %THD, Max Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
2532 - 2534	9523 - 9525	Volts C-N, %THD, Max Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
2535 - 2537	9526 - 9528	Amps A, %THD, Max Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
2538 - 253A	9529 - 9531	Amps B, %THD, Max Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
253B - 253D	9532 - 9534	Amps C, %THD, Max Timestamp	TSTAMP	1Jan2000 - 31Dec2099	1 sec		3
253E - 254F	9535 - 9552	Reserved				Reserved	18
						Block Size:	153

Option Card 1 Section

Card Identification and Configuration Block (Note 14)							read-only
270F - 270F	10000 - 10000	Class ID and card status	UINT16	bit-mapped	undv-----cccctttt	Flags active if bit is set: u=unsupported card; n=card need configuration; d=card is using default configuration; v=communication with card is ok Field: cccc=class of installed card. Field tttt=type of card. See note 19.	1
2710 - 2710	10001 - 10001	Reserved				Reserved	1
2711 - 2718	10002 - 10009	Card name	ASCII	16 char	none	ASCII name of the installed card.	8
2719 - 2720	10010 - 10017	Serial number	ASCII	16 char	none	Serial Number in ASCII of the installed card.	8
2721 - 2722	10018 - 10019	Version	ASCII	4 char	none	Version in ASCII of the hardware of the installed card.	2
2723 - 2748	10020 - 10057	Reserved				Reserved	38
2749 - 274A	10058 - 10059	Firmware Version	ASCII	4 char	none	Left justified version number and padded with spaces. It's blank for boards without embedded firmware.	2

274B - 274E	10060 - 10063	Reserved				Reserved	4
						Block Size:	64
Current Communication Settings for Option Card 1						Read-only	
274F - 274F	10064 - 10064	Current speed and format	UINT16	bit-mapped	-abcde-- fghijklm	Bps: a=57600; b=38400; c=19200; d=14400; e=9600 Stop bits 'f': cleared 1 stop bit, set 2 stop bits Parity: g=even; h=odd; i=none Data bits: j=8; k=7; l=6; m=5	1
2750 - 2750	10065 - 10065	Reserved	UINT16	bit-mapped		Reserved	1
2751 - 2751	10066 - 10066	Current protocol	UINT16	bit-mapped	----- -ppp-	ppp= 100 =DNP3 Lite; 010=ASCII Modbus; 001=RTU Modbus	1
2752 - 2752	10067 - 10067	Current reply delay	UINT16	0 to 65535	milliseconds	Delay to reply a Modbus transaction after receiving it.	1
2753 - 2756	10068 - 10071	Reserved				Reserved	4
						Block Size:	8
Data and Control Blocks						read-only	
2757 - 2790	10072 - 10129	Data and Control Block for Option Card 1. Meaning of registers depend on installed card. -- see below				Register assignments depend on which type of card is in the slot. See overlays below.	58
						Block Size:	66
Expansions for Data and Control Block for Option Card 1							
Data and Control Block -- Digital I/O Relay Card Overlay (Note 15)						read-only except as indicated	
2757 - 2757	10072 - 10072	Digital Input States	UINT16	bit-mapped	----- 22221111	Two nibble fields: (2222) for input#2 and (1111) for input #1. Lsb in each nibble is the current state of the input. Msb in each nibble is the oldest registered state.	1
2758 - 2758	10073 - 10073	Digital Relay States	UINT16	bit-mapped	----- --ab--cd	If "a" is 1 then state of Relay#2 is unknown, otherwise state of Relay#2 is informed in "c": (1=tripped, 0=released). If "b" is 1 then state of Relay#1 is unknown, otherwise state of Relay#1 is informed in "d": (1=tripped, 0=released).	1
2759 - 2759	10074 - 10074	Turn relay on	UINT16	bit-mapped	----- -21	Writing a 1 in bit N turns relay N+1 ON (this register is writeable only in privileged session).	1
275A - 275A	10075 - 10075	Turn relay off	UINT16	bit-mapped	----- -21	Writing a 1 in bit N turns relay N+1 OFF (this register is writeable only in privileged session).	1
275B - 275B	10076 - 10076	Trip/Release delay timer for Relay 1	UINT16	0 to 9999	0.1 sec	Time to trip or release.	1
275C - 275C	10077 - 10077	Trip/Release delay timer for Relay 2	UINT16	0 to 9999	0.1 sec	Time to trip or release.	1
275D - 275E	10078 - 10079	Reserved				Reserved	2
275F - 275F	10080 - 10080	Input 1 Accumulator, Scaled	UINT16	0 to 9999	resolution is 1, 10, 100, 1000, 10000, or 100000 counts	Disabled accumulators always read 0.	1
2760 - 2760	10081 - 10081	Input 2 Accumulator, Scaled	UINT16	0 to 9999			1
2761 - 2762	10082 - 10083	Reserved				Reserved	2

2763 - 2763	10084 - 10084	Relay 1 Accumulator, Scaled	UINT16	0 to 9999	resolution is 1, 10, 100, 1000, 10000, or 100000 counts	Disabled accumulators always read 0.	1
2764 - 2764	10085 - 10085	Relay 2 Accumulator, Scaled	UINT16	0 to 9999			1
2765 - 2790	10086 - 10129	Reserved				Reserved	44
						Block Size:	58
Data and Control Block -- Digital I/O Pulse Output Card Overlay (Note 15)						read-only except as indicated	
2757 - 2757	10072 - 10072	Digital Input States	UINT16	bit-mapped	dddd cccc bbbb aaaa	Nibble "dddd" for input#4, "cccc" for input#3, "bbbb" for input#2 and "aaaa" for input#1. Within each field, rightmost bit is the current state (1=closed, 0=open), and bits at left are the older states 100ms apart. (historical states). Example: xxxx xxxx xxxx 0011 Current state of input#1 is closed, before that it was closed too, before that it was open and the oldest state known is open.	1
2758 - 2758	10073 - 10073	Digital Output States	UINT16	bit-mapped	----- ----4321	One bit for each output. Bit 4 is for output #4, and bit 1 is for output #1. If a bit is set the output is closed, otherwise it is opened.	1
2759 - 2759	10074 - 10074	Pulse Output Test Select	UINT16	bit-mapped	----- ----4321	Writing 1 in bit N sets Pulse Output N+1 in test mode. Writing 0 otherwise, reestablished the output in normal operation (only while in privileged session). When Reading this reports which Pulse Output is under test according to the bits set or cleared (1=under test, 0=normal).	1
275A - 275A	10075 - 10075	Pulse Output Test Power	UINT16	bit-mapped	ddvvvvvv vvvvvvvv	This register is Writeable in privileged session only. Simulates constant Power for the Pulse Output under test. Format is same as Kt settings for Pulse Output. "V" is raw value in Wh/pulse from 0 to 9999. "dd"=decimal point position: 00=0.XXXX, 01=X.XXX, 10=XX.XX, 11=X.XXX.	1
275B - 275E	10076 - 10079	Reserved				Reserved	4
275F - 275F	10080 - 10080	Input 1 Accumulator, Scaled	UINT16	0 to 9999	resolution is 1, 10, 100, 1000, 10000, or 100000 counts	Disabled accumulators always read 0.	1
2760 - 2760	10081 - 10081	Input 2 Accumulator, Scaled	UINT16	0 to 9999			1
2761 - 2761	10082 - 10082	Input 3 Accumulator, Scaled	UINT16	0 to 9999			1
2762 - 2762	10083 - 10083	Input 4 Accumulator, Scaled	UINT16	0 to 9999			1
2763 - 2763	10084 - 10084	Output 1 Accumulator, Scaled	UINT16	0 to 9999			1
2764 - 2764	10085 - 10085	Output 2 Accumulator, Scaled	UINT16	0 to 9999			1
2765 - 2765	10086 - 10086	Output 3 Accumulator, Scaled	UINT16	0 to 9999			1
2766 - 2766	10087 - 10087	Output 4 Accumulator, Scaled	UINT16	0 to 9999			1
2767 - 2790	10088 - 10129	Reserved				Reserved	42
						Block Size:	58
Data and Control Block-- Analog Out 0-1mA / Analog Out 4-20mA (Note 15)						read-only	
2757 - 2757	10072 - 10072	Status of card	UINT16	bit-mapped	----c f-- -----	Flag fields: c=calibration not good; f=configuration error	1
2758 - 2790	10073 - 10129	Reserved	UINT16			Reserved	57
						Block Size:	58

Data and Control Block -- Reserved Block						read-only	
2757 - 2790	10072 - 10129	Reserved				Reserved	58
						Block Size:	58
Option Card 2 Section							
Card Identification and Configuration Block (Note 14)						read-only	
2AF7 - 2AF7	11000 - 11000	Class ID and card status	UINT16	bit-mapped	undv-----cccctttt	Flags active if bit is set: u=unsupported card; n=card need configuration; d=card is using default configuration; v=communication with card is ok Field: cccc=class of installed card. Field tttt=type of card. See note 19.	1
2AF8 - 2AF8	11001 - 11001	Reserved				Read only	1
2AF9 - 2B00	11002 - 11009	Card name	ASCII	16 char	none	ASCII name of the installed card.	8
2B01 - 2B08	11010 - 11017	Serial number	ASCII	16 char	none	Serial Number in ASCII of the installed card.	8
2B09 - 2B0A	11018 - 11019	Version	ASCII	4 char	none	Version in ASCII of the hardware of the installed card.	2
2B0B - 2B30	11020 - 11057	Reserved				Reserved	38
2B31 - 2B32	11058 - 11059	Firmware Version	ASCII	4 char	none	Left justified version number and padded with spaces. It's blank for boards without embedded firmware.	2
2B33 - 2B36	11060 - 11063	Reserved				Reserved	4
						Block Size:	64
Current Communication Settings for Option Card 1						Read-only	
2B37 - 2B37	11064 - 11064	Current speed and format	UINT16	bit-mapped	-abcde-- fghijklm	Bps: a=57600; b=38400; c=19200; d=14400; e=9600 Stop bits 'f': cleared 1 stop bit, set 2 stop bits Parity: g=even; h=odd; i=none Data bits: j=8; k=7; l=6; m=5	1
2B38 - 2B38	11065 - 11065	Reserved	UINT16	bit-mapped		Reserved	1
2B39 - 2B39	11066 - 11066	Current protocol	UINT16	bit-mapped	-----ppp-	ppp= 100 =DNP3 Lite; 010=ASCII Modbus; 001=RTU Modbus	1
2B3A - 2B3A	11067 - 11067	Current reply delay	UINT16	0 to 65535	milliseconds	Delay to reply a Modbus transaction after receiving it.	1
2B3B - 2B3E	11068 - 11071	Reserved				Reserved	4
						Block Size:	8
Data and Control Blocks						read-only	
2B3F - 2B78	11072 - 11129	Data and Control Block for Option Card 2 Meaning of registers depend on installed card. -- see below				Register assignments depend on which type of card is in the slot. See overlays below.	58
						Block Size:	66

Expansions for Data and Control Block for Option Card 2

Data and Control Block -- Digital I/O Relay Card Overlay (Note 15)				read-only except as indicated			
2B3F - 2B3F	11072 - 11072	Digital Input States	UINT16	bit-mapped	----- 22221111	Two nibble fields: (2222) for input#2 and (1111) for input #1. Lsb in each nibble is the current state of the input. Msb in each nibble is the oldest registered state.	1
2B40 - 2B40	11073 - 11073	Digital Relay States	UINT16	bit-mapped	----- --ab--cd	If "a" is 1 then state of Relay#2 is unknown, otherwise state of Relay#2 is informed in "c": (1=tripped, 0=released). If "b" is 1 then state of Relay#1 is unknown, otherwise state of Relay#1 is informed in "d": (1=tripped, 0=released).	1
2B41 - 2B41	11074 - 11074	Turn relay on	UINT16	bit-mapped	----- -----21	Writing a 1 in bit N turns relay N+1 ON (this register is writeable only in privileged session).	1
2B42 - 2B42	11075 - 11075	Turn relay off	UINT16	bit-mapped	----- -----21	Writing a 1 in bit N turns relay N+1 OFF (this register is writeable only in privileged session).	1
2B43 - 2B43	11076 - 11076	Trip/Release delay timer for Relay 1	UINT16	0 to 9999	0.1 sec	Time to trip or release.	1
2B44 - 2B44	11077 - 11077	Trip/Release delay timer for Relay 2	UINT16	0 to 9999	0.1 sec	Time to trip or release.	1
2B45 - 2B46	11078 - 11079	Reserved				Reserved	2
2B47 - 2B47	11080 - 11080	Input 1 Accumulator, Scaled	UINT16	0 to 9999	resolution is 1, 10, 100, 1000, 10000, or 100000 counts	Disabled accumulators always read 0.	1
2B48 - 2B48	11081 - 11081	Input 2 Accumulator, Scaled	UINT16	0 to 9999			1
2B49 - 2B4A	11082 - 11083	Reserved				Reserved	2
2B4B - 2B4B	11084 - 11084	Relay 1 Accumulator, Scaled	UINT16	0 to 9999	resolution is 1, 10, 100, 1000, 10000, or 100000 counts	Disabled accumulators always read 0.	1
2B4C - 2B4C	11085 - 11085	Relay 2 Accumulator, Scaled	UINT16	0 to 9999			1
2B4D - 2B78	11086 - 11129	Reserved				Reserved	44
						Block Size:	58
Data and Control Block -- Digital I/O Pulse Output Card Overlay (Note 15) 15)				read-only except as indicated			
2B3F - 2B3F	11072 - 11072	Digital Input States	UINT16	bit-mapped	dddd cccc bbbb aaaa	Nibble "dddd" for input#4, "cccc" for input#3, "bbbb" for input#2 and "aaaa" for input#1. Within each field, rightmost bit is the current state (1=closed, 0=open), and bits at left are the older states 100ms apart (historical states). Example: xxxx xxxx xxxx 0011 Current state of input#1 is closed, before that it was closed too, before that it was open and the oldest state known is open.	1
2B40 - 2B40	11073 - 11073	Digital Output States	UINT16	bit-mapped	----- ----4321	One bit for each output. Bit 4 is for output #4, and bit 1 is for output #1. If a bit is set the output is closed, otherwise it is opened.	1
2B41 - 2B41	11074 - 11074	Pulse Output Test Select	UINT16	bit-mapped	----- ----4321	Writing 1 in bit N sets Pulse Output N+1 in test mode. Writing 0 otherwise, reestablished the output in normal operation (only while in privileged session). When Reading this reports which Pulse Output is under test according to the bits set or cleared (1=under test, 0=normal).	1

2B42 - 2B42	11075 - 11075	Pulse Output Test Power	UINT16	bit-mapped	ddvvvvvv vvvvvvvv	This register is Writeable in privileged session only. Simulates constant Power for the Pulse Output under test. Format is same as Kt settings for Pulse Output. "V" is raw value in Wh/pulse from 0 to 9999. "dd"=decimal point position: 00=0.XXXX, 01=X.XXX, 10=XX.XX, 11=X.XXX.	1
2B43 - 2B46	11076 - 11079	Reserved				Reserved	4
2B47 - 2B47	11080 - 11080	Input 1 Accumulator, Scaled	UINT16	0 to 9999	resolution is 1, 10, 100, 1000, 10000, or 100000 counts	Disabled accumulators always read 0.	1
2B48 - 2B48	11081 - 11081	Input 2 Accumulator, Scaled	UINT16	0 to 9999			1
2B49 - 2B49	11082 - 11082	Input 3 Accumulator, Scaled	UINT16	0 to 9999			1
2B4A - 2B4A	11083 - 11083	Input 4 Accumulator, Scaled	UINT16	0 to 9999			1
2B4B - 2B4B	11084 - 11084	Output 1 Accumulator, Scaled	UINT16	0 to 9999			1
2B4C - 2B4C	11085 - 11085	Output 2 Accumulator, Scaled	UINT16	0 to 9999			1
2B4D - 2B4D	11086 - 11086	Output 3 Accumulator, Scaled	UINT16	0 to 9999			1
2B4E - 2B4E	11087 - 11087	Output 4 Accumulator, Scaled	UINT16	0 to 9999			1
2B4F - 2B78	11088 - 11129	Reserved				Reserved	42
						Block Size:	58
Data and Control Block--Analog Out 0-1mA / Analog Out 4-20mA (Note 15)						read-only	
2B3F - 2B3F	11072 - 11072	Status of card	UINT16	bit-mapped	----cf--	Flag fields: c=calibration not good; f=configuration error	1
2B40 - 2B78	11073 - 11129	Reserved	UINT16			Reserved	57
						Block Size:	58
Accumulators Block						read-only	
2EDF - 2EE0	12000 - 12001	Option Card 1, Input 1 Accumulator	UINT32	0 to 999999999	number of transitions	These are unscaled counts. See option card section for scaled versions. Input accumulators count either or both transitions; output accumulators count both transitions. Unused accumulators always read 0.	2
2EE1 - 2EE6	12002 - 12007	Option Card 1, Inputs 2-4 Accumulators	UINT32	0 to 999999999	number of transitions		6
2EE7 - 2EE8	12008 - 12009	Option Card 1, Output or Relay 1 Accumulator	UINT32	0 to 999999999	number of transitions		2
2EE9 - 2EEE	12010 - 12015	Option Card 1, Output or Relays 2-4	UINT32	0 to 999999999	number of transitions		6
2EEF - 2EF6	12016 - 12023	Option Card 2 Inputs Accumulators	UINT32	0 to 999999999	number of transitions		8
2EF7 - 2EFE	12024 - 12031	Option Card 2 Outputs Accumulators	UINT32	0 to 999999999	number of transitions		8
						Block Size:	32
Commands Section4							
Resets Block9						write-only	
4E1F - 4E1F	20000 - 20000	Reset Max/Min Blocks	UINT16	password5		Set to 0.	1
4E20 - 4E20	20001 - 20001	Reset Energy Accumulators	UINT16	password5			1
4E21 - 4E21	20002 - 20002	Reserved					1
4E22 - 4E22	20003 - 20003	Reserved					1
4E23 - 4E23	20004 - 20004	Reserved					1
4E24 - 4E24	20005 - 20005	Reserved					1
4E25 - 4E25	20006 - 20006	Reserved					1
4E26 - 4E26	20007 - 20007	Reserved					1
Reserved Registers							
4E27 - 4E2E	20008 - 20015	Reserved				Set to 0.	8
						Block Size:	16

Privileged Commands Block				conditional write			
5207 - 5207	21000 - 21000	Initiate Meter Firmware Reprogramming	UINT16	password5			1
5208 - 5208	21001 - 21001	Force Meter Restart	UINT16	password5		Causes a watchdog reset, always reads 0.	1
5209 - 5209	21002 - 21002	Open Privileged Command Session	UINT16	password5		Meter will process command registers (this register through 'Close Privileged Command Session' register below) for 5 minutes or until the session is closed, whichever comes first.	1
520A - 520A	21003 - 21003	Initiate Programmable Settings Update	UINT16	password5		Meter enters PS update mode.	1
520B - 520B	21004 - 21004	Calculate Programmable Settings Checksum3	UINT16	0000 to 9999		Meter calculates checksum on RAM copy of PS block.	1
520C - 520C	21005 - 21005	Programmable Settings Checksum3	UINT16	0000 to 9999		Read/write checksum register; PS block saved in nonvolatile memory on write ⁸ .	1
520D - 520D	21006 - 21006	Write New Password3	UINT16	0000 to 9999		Write-only register; always reads zero.	1
520E - 520E	21007 - 21007	Terminate Programmable Settings Update3	UINT16	any value		Meter leaves PS update mode via reset.	1
520F - 5211	21008 - 21010	Set Meter Clock	TSTAMP	1Jan2000 - 31Dec2099	1 sec	Saved only when 3rd register is written.	3
5212 - 5212	21011 - 21011	Reserved				Set to 0.	1
5213 - 5219	21012 - 21018	Reserved				Set to 0.	7
521A - 521A	21019 - 21019	Close Privileged Command Session	UINT16	any value		Ends an open command session.	1
						Block Size:	20
Encryption Block				read/write			
658F - 659A	26000 - 26011	Perform a Secure Operation	UINT16			Encrypted command to read password or change meter type.	12
						Block Size:	12
Programmable Settings Section							
Basic Setups Block				write only in PS update mode			
752F - 752F	30000 - 30000	CT multiplier & denominator	UINT16	bit-mapped	ddddddddd mmmmmmm	High byte is denominator (1 or 5, read-only), low byte is multiplier (1, 10, or 100).	1
7530 - 7530	30001 - 30001	CT numerator	UINT16	1 to 9999	none		1
7531 - 7531	30002 - 30002	PT numerator	UINT16	1 to 9999	none		1
7532 - 7532	30003 - 30003	PT denominator	UINT16	1 to 9999	none		1
7533 - 7533	30004 - 30004	PT multiplier & hookup	UINT16	bit-mapped	mmmmmmmm mmmh hhh	mm...mm = PT multiplier (1, 10, 100, or 1000) hhh = hookup enumeration (0 = 3 element wye[9S], 1 = delta 2 CTs[5S], 3 = 2.5 element wye[6S])	1
7534 - 7534	30005 - 30005	Averaging Method	UINT16	bit-mapped	--iiiiii b----sss	iiiiii = interval (5,15,30,60) b = 0-block or 1-rolling sss = # subintervals (1,2,3,4)	1
7535 - 7535	30006 - 30006	Power & Energy Format	UINT16	bit-mapped	pppp--nn -eee-ddd	pppp = power scale (0-unit, 3-kilo, 6-mega, 8-auto) nn = number of energy digits (5-8 --> 0-3) eee = energy scale (0-unit, 3-kilo, 6-mega) ddd = energy digits after decimal point (0-6) See note 10.	1

7536 - 7536	30007 - 30007	Operating Mode Screen Enables	UINT16	bit-mapped	----- eeeeeeee	eeeeeeee = op mode screen rows on/off, rows top to bottom are bits low order to high order.	1
753E - 753E	30015 - 30015	User Settings Flags	UINT16	bit-mapped	---g--nn srpdwff-	g = enable alternate full scale bar graph current (1=on, 0=off) nn = number of phases for voltage & current screens (3=ABC, 2=AB, 1=A, 0=ABC) s = scroll (1=on, 0=off) r = password for reset in use (1=on, 0=off) p = password for configuration in use (1=on, 0=off) d = daylight saving time changes (0=off, 1=on) y = diagnostic events in system log (1=yes, 0=no) w = power direction (0=view as load, 1=view as generator) f = flip power factor sign (1=yes, 0=no)	1
753F - 753F	30016 - 30016	Full Scale Current (for load % bar graph)	UINT16	0 to 9999	none	If non-zero and user settings bit g is set, this value replaces CT numerator in the full scale current calculation.	1
7540 - 7547	30017 - 30024	Meter Designation	ASCII	16 char	none		8
7548 - 7548	30025 - 30025	Reserved				Set to 0.	1
7549 - 7549	30026 - 30026	COM2 setup	UINT16	bit-mapped	---d d d d - p p p - b b b	d d d d = reply delay (* 50 msec) p p p = protocol (1-Modbus RTU, 2-Modbus ASCII, 3-DNP) b b b = baud rate (1-9600, 2-19200, 4-38400, 6-57600)	1
754A - 754A	30027 - 30027	COM2 address	UINT16	1 to 247	none		1
754B - 754B	30028 - 30028	Limit #1 Identifier	UINT16	0 to 65535		Use Modbus address as the identifier (see notes 7, 11, 12).	1
754C - 754C	30029 - 30029	Limit #1 Out High Setpoint	SINT16	-200.0 to +200.0	0.1% of full scale	Setpoint for the "above" limit (LM1), see notes 11-12.	1
754D - 754D	30030 - 30030	Limit #1 In High Threshold	SINT16	-200.0 to +200.0	0.1% of full scale	Threshold at which "above" limit clears; normally less than or equal to the "above" setpoint; see notes 11-12.	1
754E - 754E	30031 - 30031	Limit #1 Out Low Setpoint	SINT16	-200.0 to +200.0	0.1% of full scale	Setpoint for the "below" limit (LM2), see notes 11-12.	1
754F - 754F	30032 - 30032	Limit #1 In Low Threshold	SINT16	-200.0 to +200.0	0.1% of full scale	Threshold at which "below" limit clears; normally greater than or equal to the "below" setpoint; see notes 11-12.	1
7550 - 7554	30033 - 30037	Limit #2	SINT16	Same as Limit #1.	Same as Limit #1.	Same as Limit #1.	5
7555 - 7559	30038 - 30042	Limit #3	SINT16				5
755A - 755E	30043 - 30047	Limit #4	SINT16				5
755F - 7563	30048 - 30052	Limit #5	SINT16				5
7564 - 7568	30053 - 30057	Limit #6	SINT16				5
7569 - 756D	30058 - 30062	Limit #7	SINT16				5
756E - 7572	30063 - 30067	Limit #8	SINT16				5
7573 - 7582	30068 - 30083	Reserved				Set to 0.	16
7583 - 75C2	30084 - 30147	Reserved				Set to 0.	64
75C3 - 75E5	30148 - 30182	Reserved				Set to 0.	35
75E6 - 75E6	30183 - 30183	Programmable Settings Update Counter	UINT16	0-65535		Increments each time programmable settings are changed; occurs when new checksum is calculated.	1
75E7 - 7626	30184 - 30247	Reserved for Software Use				Set to 0.	64
						Block Size:	248

Reserved Block						write only in PS update mode	
7917 - 7B56	31000 - 31575	Reserved				Set to 0.	576
Reserved Registers. Set to 0.							
7B57 - 7B76	31576 - 31607	Reserved				Set to 0.	32
						Block Size:	608
Programmable Settings for Option Card 1							
Option Card 1 Setups Block						write only in PS update mode	
7CFF - 7CFF	32000 - 32000	Class ID of the Option Card 1 Settings	UINT16	bit-mapped	----- cccctttt	Which class (cccc) and type(tttt) of card the Option Settings for Card 1 apply to. See note 19.	1
7D00 - 7D3E	32001 - 32063	Settings for Option Card 1, First Overlay -- see below	Register assignments depend on which type of card is in the slot. See overlays below.				63
7D3F - 7F3E	32064 - 32575	Settings for Option Card 1, Second Overlay -- see below	Register assignments depend on which type of card is in the slot. See overlays below.				512
						Block Size:	576
Overlays for Option Card 1 Programmable Settings							
Settings Registers for any communication capable card, including analog cards					First Overlay	write only in PS update mode	
7D00 - 7D00	32001 - 32001	Slave address	UINT16	1-247 (for Modbus) 1-65534 (for DNP)	none	Slave address of the unit. The communication capable card is always a master. Set to 0 when an analog board is installed.	1
7D01 - 7D01	32002 - 32002	Speed and format	UINT16	bit-mapped	-abcde--fghijklm	Bps: a=57600; b=38400; c=19200; d=14400; e=9600 Stop bits 'f': cleared 1 stop bit, set 2 stop bits Parity: g=even; h=odd; i=none Data bits: j=8; k=7; l=6; m=5 Set to 0 when an analog board is installed.	1
7D02 - 7D02	32003 - 32003	Reserved	UINT16	bit-mapped		Set to 0.	1
7D03 - 7D03	32004 - 32004	Protocol	UINT16	bit-mapped	----- ----ppp-	ppp= 100 =DNP3 Lite; 010=ASCII Modbus; 001=RTU Modbus Set to 0 when an analog board is installed.	1
7D04 - 7D04	32005 - 32005	Reply delay	UINT16	0 to 65535	milliseconds	Delay to reply to a Modbus transaction after receiving it. Set to 0 when an analog board is installed.	1
7D05 - 7D3E	32006 - 32063	Reserved				Set to 0.	58
						Block Size:	63
Settings Registers for Digital I/O Relay Card					First Overlay	write only in PS update mode	
7D00 - 7D00	32001 - 32001	Input#1 - 2 bindings & logging enables	UINT16	bit-mapped	----- 2222 1111	One nibble for each input. Assuming "abcd" as the bits in each nibble: "a": select this input for EOI (End Of Interval)pulse sensing. "b": log this input when pulse is detected "cc": Input event trigger mode - Contact sensing method; 00 = none; 01 = open to close; 10 = close to open; 11 = any change.	1
7D01 - 7D01	32002 - 32002	Relay #1 Delay to Operate	UINT16	0.1 second units		Delay to operate the relay since request.	1
7D02 - 7D02	32003 - 32003	Relay #1 Delay to Release	UINT16	0.1 second units		Delay to release the relay since request.	1
7D03 - 7D08	32004 - 32009	Reserved	UINT16			Set to 0.	6
7D09 - 7D09	32010 - 32010	Relay #2 Delay to Operate	UINT16	0.1 second units		Delay to operate the relay since request.	1
7D0A - 7D0A	32011 - 32011	Relay #2 Delay to Release	UINT16	0.1 second units		Delay to release the relay since request.	1
7D0B - 7D20	32012 - 32033	Reserved	UINT16			Set to 0.	22

7D21 - 7D21	32034 - 32034	Input Accumulators Scaling	UINT16	bit-mapped	----- 22221111	* 4 bits per accumulator	1
7D22 - 7D22	32035 - 32035	Relay Accumulators Scaling	UINT16	bit-mapped	----- 22221111	* 0xF disables the accumulation * 0-5 = power of divisor for the scaled accumulator Example: count=12456, 4bits=3: divisor=103=1000 & scaled accumulator=12.	1
7D23 - 7D3E	32036 - 32063	Reserved				Set to 0.	28
						Block Size:	63
Settings Registers for Digital I/O Pulse Output Card					First Overlay	write only in PS update mode	
7D00 - 7D00	32001 - 32001	Input#1 - 4 bindings & logging enables	UINT16	bit-mapped	44443333 22221111	One nibble for each of the 4 inputs. Assuming "-bcc" as the bits in each nibble: "b": Log this input when pulse is detected "cc": Input event trigger mode - Contact sensing method; 00 = none; 01 = open to close; 10 = close to open; 11 = any change.	1
7D01 - 7D01	32002 - 32002	Source for Pulse Output#1	UINT16	enumeration	----ppp ----vvvv	"ppp" (Phase) : 000 = none, 001 = Phase A, 010 = Phase B, 011 = Phase C, 100 = All Phases, 101 = Pulse from EOI(End Of Interval). "vvvv"(Value) : 0000= none, 0001 = Wh, 0010 = +Wh, 0011 = -Wh, 0100= Varh, 0101 = +Varh, 0110 = -Varh, 0111 = VAh, 1000= Received Wh, 1001= Delivered Wh, 1010= Inductive Varh, 1011 = Capacitive Varh	1
7D02 - 7D02	32003 - 32003	Kt [Wh/pulse] factor for Pulse Output#1	UINT16	bit-mapped	ddVVVVVV VVVVVVVV	"V...V" = not scaled energy value per pulse, from 0 to 9999. "dd"= decimal point position: 00=0.XXXX, 01=X.XXX, 10=XX.XX, 11= X.XXX.	1
7D03 - 7D04	32004 - 32005	Output#2 Assignment and Kt	UINT16	Same as Output #1.			2
7D05 - 7D06	32006 - 32007	Output#3 Assignment and Kt	UINT16	Same as Output #1.			2
7D07 - 7D08	32008 - 32009	Output#4 Assignment and Kt	UINT16	Same as Output #1.			2
7D09 - 7D09	32010 - 32010	Input Accumulators Scaling	UINT16	bit-mapped	44443333 22221111	See Relay Card above.	1
7D0A - 7D0A	32011 - 32011	Output Accumulators Scaling	UINT16	bit-mapped	44443333 22221111		1
7D0B - 7D3E	32012 - 32063	Reserved				Set to 0.	52
						Block Size:	63
Settings Registers for Digital I/O Relay Card					Second Overlay	write only in PS update mode	
7D3F - 7D46	32064 - 32071	Input#1 Label	ASCII	16 char			8
7D47 - 7D4E	32072 - 32079	Input#1 Low State Name	ASCII	16 char			8
7D4F - 7D56	32080 - 32087	Input#1 High State Name	ASCII	16 char			8
7D57 - 7D6E	32088 - 32111	Input#2 Label and State Names	Same as Input #1.				24
7D6F - 7D9E	32112 - 32159	Reserved				Set to 0.	48
7D9F - 7DA6	32160 - 32167	Relay#1 Label	ASCII	16 char			8
7DA7 - 7DAE	32168 - 32175	Relay#1 Open State Name	ASCII	16 char			8
7DAF - 7DB6	32176 - 32183	Relay#1 Closed State Name	ASCII	16 char			8

7DB7 - 7DCE	32184 - 32207	Relay#2 Label and State Names	Same as Relay #1.				24
7DCF - 7DFE	32208 - 32255	Reserved				Set to 0.	48
7DFF - 7E06	32256 - 32263	Input#1 Accumulator Label	ASCII	16 char			8
7E07 - 7E0E	32264 - 32271	Input#2 Accumulator Label	ASCII	16 char			8
7E0F - 7E1E	32272 - 32287	Reserved				Set to 0.	16
7E1F - 7E1F	32288 - 32288	Input#1 Accumulator Kt	UINT16	bit-mapped	ddVVVVVV VVVVVVVV	KT power factor for the Pulse Output.	1
7E20 - 7E20	32289 - 32289	Input#2 Accumulator Kt	UINT16	bit-mapped	ddVVVVVV VVVVVVVV	"V" is raw power value in Wh/pulse from 0 to 9999. "dd"=decimal point position: 00=0.XXXX, 01=X.XXX,	1
7E21 - 7F3E	32290 - 32575	Reserved				Set to 0.	286
						Block Size:	512
Settings Registers for Digital I/O Pulse Output Card					Second Overlay	write only in PS update mode	
7D3F - 7D46	32064 - 32071	Input#1 Label	ASCII	16 char			8
7D47 - 7D4E	32072 - 32079	Input#1 Low State Name	ASCII	16 char			8
7D4F - 7D56	32080 - 32087	Input#1 High State Name	ASCII	16 char			8
7D57 - 7D6E	32088 - 32111	Input#2 Label and State Names	Same as Input #1.				24
7D6F - 7D86	32112 - 32135	Input#3 Label and State Names	Same as Input #1.				24
7D87 - 7D9E	32136 - 32159	Input#4 Label and State Names	Same as Input #1.				24
7D9F - 7DA6	32160 - 32167	Output#1 Label	ASCII	16 char			8
7DA7 - 7DAE	32168 - 32175	Output#1 Open State Name	ASCII	16 char			8
7DAF - 7DB6	32176 - 32183	Output#1 Closed State Name	ASCII	16 char			8
7DB7 - 7DCE	32184 - 32207	Output#2 Label and State Names	Same as Output #1.				24
7DCF - 7DE6	32208 - 32231	Output#3 Label and State Names	Same as Output #1.				24
7DE7 - 7DFE	32232 - 32255	Output#4 Label and State Names	Same as Output #1.				24
7DFF - 7E06	32256 - 32263	Input#1 Accumulator Label	ASCII	16 char			8
7E07 - 7E0E	32264 - 32271	Input#2 Accumulator Label	ASCII	16 char			8
7E0F - 7E16	32272 - 32279	Input#3 Accumulator Label	ASCII	16 char			8
7E17 - 7E1E	32280 - 32287	Input#4 Accumulator Label	ASCII	16 char			8
7E1F - 7E1F	32288 - 32288	Input#1 Accumulator Kt	UINT16	bit-mapped	ddVVVVVV VVVVVVVV	KT power factor for the accumulator input.	1
7E20 - 7E20	32289 - 32289	Input#2 Accumulator Kt	UINT16	bit-mapped	ddVVVVVV VVVVVVVV	"V" is raw power value in Wh/pulse from 0 to 9999.	1
7E21 - 7E21	32290 - 32290	Input#3 Accumulator Kt	UINT16	bit-mapped	ddVVVVVV VVVVVVVV	"dd"=decimal point position: 00=0.XXXX, 01=X.XXX,	1
7E22 - 7E22	32291 - 32291	Input#4 Accumulator Kt	UINT16	bit-mapped	ddVVVVVV VVVVVVVV	10=XX.XX, 11= X.XXX.	1
7E23 - 7F3E	32292 - 32575	Reserved				Set to 0.	284
						Block Size:	512
Settings Registers for Analog Out 0-1mA / Analog Out 4-20mA Cards					Second Overlay	write only in PS update mode	
7D3F - 7D3F	32064 - 32064	Update rate	UINT16	0 to 65535	milliseconds	Set to 0.	1
7D40 - 7D40	32065 - 32065	Channel direction - 1mA Card only!	UINT16	bit-mapped	----- ----4321	Full range output for 0-1mA card only: A bit set(1) means full range (-1mA to +1mA); a bit cleared(0) means source only (0mA to +1mA).	1
7D41 - 7D41	32066 - 32066	Format parameter for output #1	UINT16	bit-mapped	----- ---f suwb	Format of the polled register:f=float 32; s=signed 32 bit int; u=unsigned 32 bit int; w=signed 16 bit int; b=unsigned 16 bit int.	1
7D42 - 7D42	32067 - 32067	Source register for Output#1	UINT16	0 to 65535		This register should be programmed with the address of the register, whose value is to be used for current output. In different words, the current level output of analog board will change with the value of the register pointed here.	1

7D43 - 7D44	32068 - 32069	High value of source register for output#1	Depends on the format parameter			Value read from the source register at which High nominal current will be output. Example: for the 4-20mA card, if this register is programmed with 750, then the current output will be 20mA when the value read from the source register is 750.	2
7D45 - 7D46	32070 - 32071	Low value of source register for output#1	Depends on the format parameter			Value read from the source register at which Low nominal current will be output. Example: for the 4-20mA card, if this register is programmed with 0, then the current output will be 4mA when the value read from the source register is 0.	2
7D47 - 7D4C	32072 - 32077	Analog output#2 format, register, max & min	Same as analog output #1.				6
7D4D - 7D52	32078 - 32083	Analog output#3 format, register, max & min	Same as analog output.#1.				6
7D53 - 7D58	32084 - 32089	Analog output#4 format, register, max & min	Same as analog output #1.				6
7D59 - 7F3E	32090 - 32575	Reserved				Set to 0.	486
						Block Size:	512
Programmable Settings for Option Card 2							
Option Card 2 Setups Block						write only in PS update mode	
80E7 - 80E7	33000 - 33000	Class ID of the Option Card 2 Settings	UINT16	bit-mapped	----- cccctttt	Which class (cccc) and type(tttt) of card the Option Settings for Card 2 apply to. See note 19.	1
80E8 - 8126	33001 - 33063	Settings for Option Card 2, First Overlay -- see below	Register assignments depend on which type of card is in the slot. See overlays below.				63
8127 - 8326	33064 - 33575	Settings for Option Card 2, Second Overlay -- see below	Register assignments depend on which type of card is in the slot. See overlays below.				512
						Block Size:	576
Overlays for Option Card 2 Programmable Settings							
Settings Registers for any communication capable card, including analog cards					First Overlay	write only in PS update mode	
80E8 - 80E8	33001 - 33001	Slave address	UINT16	1~247 (for Modbus) 1~65534 (for DNP)	none	Slave address of the unit. The communication capable card is always a master. Set to 0 when an analog board is installed.	1
80E9 - 80E9	33002 - 33002	Speed and format	UINT16	bit-mapped	-abcde--fghijklm	Bps: a=57600; b=38400; c=19200; d=14400; e=9600 Stop bits 'f': cleared 1 stop bit, set 2 stop bits Parity: g=even; h=odd; i=none Data bits: j=8; k=7; l=6; m=5 Set to 0 when an analog board is installed.	1
80EA - 80EA	33003 - 33003	Reserved	UINT16	bit-mapped		Set to 0.	1
80EB - 80EB	33004 - 33004	Protocol	UINT16	bit-mapped	----- ----ppp-	ppp= 100 =DNP3 Lite; 010=Ascii Modbus; 001=Rtu Modbus Set to 0 when an analog board is installed.	1
80EC - 80EC	33005 - 33005	Reply delay	UINT16	0 to 65535	milliseconds	Delay to reply to a Modbus transaction after receiving it. Set to 0 when an analog board is installed	1
80ED - 8126	33006 - 33063	Reserved				Set to 0.	58
						Block Size:	63

Settings Registers for Digital I/O Relay Card					First Overlay	write only in PS update mode	
80E8 - 80E8	33001 - 33001	Input#1 - 2 bindings & logging enables	UINT16	bit-mapped	----- 2222 1111	One nibble for each input. Assuming "abcd" as the bits in each nibble: "a": select this input for EOI (End Of Interval)pulse sensing. "b": log this input when pulse is detected "cc": Input event trigger mode - Contact sensing method; 00 = none; 01 = open to close; 10 = close to open; 11 = any change.	1
80E9 - 80E9	33002 - 33002	Relay #1 Delay to Operate	UINT16	0.1 second units		Delay to operate the relay since request.	1
80EA - 80EA	33003 - 33003	Relay #1 Delay to Release	UINT16	0.1 second units		Delay to release the relay since request.	1
80EB - 80F0	33004 - 33009	Reserved	UINT16			Set to 0.	6
80F1 - 80F1	33010 - 33010	Relay #2 Delay to Operate	UINT16	0.1 second units		Delay to operate the relay since request.	1
80F2 - 80F2	33011 - 33011	Relay #2 Delay to Release	UINT16	0.1 second units		Delay to release the relay since request.	1
80F3 - 8108	33012 - 33033	Reserved	UINT16			Set to 0.	22
8109 - 8109	33034 - 33034	Input Accumulators Scaling	UINT16	bit-mapped	----- 22221111	* 4 bits per accumulator	1
810A - 810A	33035 - 33035	Relay Accumulators Scaling	UINT16	bit-mapped	----- 22221111	* 0xF disables the accumulation * 0-5 = power of divisor for the scaled accumulator Example: count=12456, 4bits=3: divisor=103=1000 & scaled accumulator=12.	1
810B - 8126	33036 - 33063	Reserved				Set to 0.	28
						Block Size:	63
Settings Registers for Digital I/O Pulse Output Card					First Overlay	write only in PS update mode	
80E8 - 80E8	33001 - 33001	Input#1 - 4 bindings & logging enables	UINT16	bit-mapped	44443333 22221111	One nibble for each of the 4 inputs. Assuming "-bcc" as the bits in each nibble: "b": Log this input when pulse is detected "cc": Input event trigger mode - Contact sensing method; 00 = none; 01 = open to close; 10 = close to open; 11 = any change.	1
80E9 - 80E9	33002 - 33002	Source for Pulse Ouput#1	UINT16	enumeration	-----ppp ----vvvv	"ppp" (Phase) : 000 = none, 001 = Phase A, 010 = Phase B, 011 = Phase C, 100 = All Phases, 101 = Pulse from EOI(End Of Interval). "vvvv"(Value) : 0000= none, 0001 = Wh, 0010 = +Wh, 0011 = -Wh, 0100= Varh, 0101 = +Varh, 0110 = -Varh, 0111 = VAh, 1000= Received Wh, 1001= Delivered Wh, 1010= Inductive Varh, 1011 = Capacitive Varh	1
80EA - 80EA	33003 - 33003	Kt [Wh/pulse] factor for Pulse Output#1	UINT16	bit-mapped	ddVVVVVV VVVVVVV	"V...V" = not scaled energy value per pulse, from 0 to 9999. "dd"= decimal point position: 00=0.XXXX, 01=X.XXX, 10=XX.XX, 11= X.XXX.	1
80EB - 80EC	33004 - 33005	Output#2 Assignment and Kt	UINT16		Same as Output #1.		2
80ED - 80EE	33006 - 33007	Output#3 Assignment and Kt	UINT16		Same as Output #1.		2

80EF - 80F0	33008 - 33009	Output#4 Assignment and Kt	UINT16	Same as Output #1.			2
80F1 - 80F1	33010 - 33010	Input Accumulators Scaling	UINT16	bit-mapped	44443333 22221111	See Relay Card above.	1
80F2 - 80F2	33011 - 33011	Output Accumulators Scaling	UINT16	bit-mapped	44443333 22221111		1
80F3 - 8126	33012 - 33063	Reserved				Set to 0.	52
						Block Size:	63
Settings Registers for Digital I/O Relay Card				Second Overlay	write only in PS update mode		
8127 - 812E	33064 - 33071	Input#1 Label	ASCII	16 char			8
812F - 8136	33072 - 33079	Input#1 Low State Name	ASCII	16 char			8
8137 - 813E	33080 - 33087	Input#1 High State Name	ASCII	16 char			8
813F - 8156	33088 - 33111	Input#2 Label and State Names		Same as Input #1.			24
8157 - 8186	33112 - 33159	Reserved				Set to 0.	48
8187 - 818E	33160 - 33167	Relay#1 Label	ASCII	16 char			8
818F - 8196	33168 - 33175	Relay#1 Open State Name	ASCII	16 char			8
8197 - 819E	33176 - 33183	Relay#1 Closed State Name	ASCII	16 char			8
819F - 81B6	33184 - 33207	Relay#2 Label and State Names		Same as Relay #1.			24
81B7 - 81E6	33208 - 33255	Reserved				Set to 0.	48
81E7 - 81EE	33256 - 33263	Input#1 Accumulator Label	ASCII	16 char			8
81EF - 81F6	33264 - 33271	Input#2 Accumulator Label	ASCII	16 char			8
81F7 - 8206	33272 - 33287	Reserved				Set to 0.	16
8207 - 8207	33288 - 33288	Input#1 Accumulator Kt	UINT16	bit-mapped	ddVVVVVV VVVVVVV	KT power factor for the Pulse Output "V" is raw power value in Wh/pulse from 0 to 9999. "dd"=decimal point position: 00=0.XXXX, 01=X.XXX, 10=XX.XX, 11= X.XXX.	1
8208 - 8208	33289 - 33289	Input#2 Accumulator Kt	UINT16	bit-mapped	ddVVVVVV VVVVVVV		1
8209 - 8326	33290 - 33575	Reserved				Set to 0.	286
						Block Size:	512
Settings Registers for Digital I/O Pulse Output Card				Second Overlay	write only in PS update mode		
8127 - 812E	33064 - 33071	Input#1 Label	ASCII	16 char			8
812F - 8136	33072 - 33079	Input#1 Low State Name	ASCII	16 char			8
8137 - 813E	33080 - 33087	Input#1 High State Name	ASCII	16 char			8
813F - 8156	33088 - 33111	Input#2 Label and State Names		Same as Input #1.			24
8157 - 816E	33112 - 33135	Input#3 Label and State Names		Same as Input #1.			24
816F - 8186	33136 - 33159	Input#4 Label and State Names		Same as Input #1.			24
8187 - 818E	33160 - 33167	Output#1 Label	ASCII	16 char			8
818F - 8196	33168 - 33175	Output#1 Open State Name	ASCII	16 char			8
8197 - 819E	33176 - 33183	Output#1 Closed State Name	ASCII	16 char			8
819F - 81B6	33184 - 33207	Output#2 Label and State Names		Same as Output #1.			24
81B7 - 81CE	33208 - 33231	Output#3 Label and State Names		Same as Output #1.			24
81CF - 81E6	33232 - 33255	Output#4 Label and State Names		Same as Output #1.			24
81E7 - 81EE	33256 - 33263	Input#1 Accumulator Label	ASCII	16 char			8
81EF - 81F6	33264 - 33271	Input#2 Accumulator Label	ASCII	16 char			8
81F7 - 81FE	33272 - 33279	Input#3 Accumulator Label	ASCII	16 char			8
81FF - 8206	33280 - 33287	Input#4 Accumulator Label	ASCII	16 char			8

8207 - 8207	33288 - 33288	Input#1 Accumulator Kt	UINT16	bit-mapped	ddVVVVVV VVVVVVVV	KT power factor for the accumulator input	1
8208 - 8208	33289 - 33289	Input#2 Accumulator Kt	UINT16	bit-mapped	ddVVVVVV VVVVVVVV	"V" is raw power value in Wh/pulse from 0 to 9999.	1
8209 - 8209	33290 - 33290	Input#3 Accumulator Kt	UINT16	bit-mapped	ddVVVVVV VVVVVVVV	"dd"=decimal point position: 00=0.XXXX, 01=X.XXX,	1
820A - 820A	33291 - 33291	Input#4 Accumulator Kt	UINT16	bit-mapped	ddVVVVVV VVVVVVVV	10=XX.XX, 11= X.XXX.	1
820B - 8326	33292 - 33575	Reserved				Set to 0.	284
						Block Size:	512
Settings Registers for Analog Out 0-1mA / Analog Out 4-20mA Cards					Second Overlay	write only in PS update mode	
8127 - 8127	33064 - 33064	Update rate	UINT16	0 to 65535	milliseconds	Set to 0.	1
8128 - 8128	33065 - 33065	Channel direction - 1mA Card only!	UINT16	bit-mapped	----- -4321	Full range output for 0-1mA card only: A bit set(1) means full range (-1mA to +1mA); a bit cleared(0) means source only (0mA to +1mA).	1
8129 - 8129	33066 - 33066	Format parameter for output #1	UINT16	bit-mapped	----- -f suwb	Format of the polled register:f=float 32; s=signed 32 bit int; u=unsigned 32 bit int; w=signed 16 bit int; b=unsigned 16 bit int.	1
812A - 812A	33067 - 33067	Source register for Output#1	UINT16	0 to 65535		This register should be programmed with the address of the register, whose value is to be used for current output. In different words, the current level output of analog board will change with the value of the register pointed here.	1
812B - 812C	33068 - 33069	High value of source register for output#1	Depends on the format parameter			Value read from the source register at which High nominal current will be output. Example: for the 4-20mA card, if this register is programmed with 750, then the current output will be 20mA when the value read from the source register is 750.	2
812D - 812E	33070 - 33071	Low value of source register for output#1	Depends on the format parameter			Value read from the source register at which Low nominal current will be output. Example: for the 4-20mA card, if this register is programmed with 0, then the current output will be 4mA when the value read from the source register is 0.	2
812F - 8134	33072 - 33077	Analog output#2 format, register, max & min	Same as analog output #1.				6
8135 - 813A	33078 - 33083	Analog output#3 format, register, max & min	Same as analog output #1.				6
813B - 8140	33084 - 33089	Analog output#4 format, register, max & min	Same as analog output #1.				6
8141 - 8326	33090 - 33575	Reserved				Set to 0.	486
						Block Size:	512

Secondary Readings Section

Secondary Block						read-only except as noted	
9C40 - 9C40	40001 - 40001	System Sanity Indicator	UINT16	0 or 1	none	0 indicates proper meter operation.	1
9C41 - 9C41	40002 - 40002	Volts A-N	UINT16	2047 to 4095	volts	2047= 0, 4095= +150	1
9C42 - 9C42	40003 - 40003	Volts B-N	UINT16	2047 to 4095	volts	volts = 150 * (register - 2047) / 2047	1
9C43 - 9C43	40004 - 40004	Volts C-N	UINT16	2047 to 4095	volts		1
9C44 - 9C44	40005 - 40005	Amps A	UINT16	0 to 4095	amps	0= -10, 2047= 0, 4095= +10	1
9C45 - 9C45	40006 - 40006	Amps B	UINT16	0 to 4095	amps	amps = 10 * (register - 2047) / 2047	1
9C46 - 9C46	40007 - 40007	Amps C	UINT16	0 to 4095	amps		1
9C47 - 9C47	40008 - 40008	Watts, 3-Ph total	UINT16	0 to 4095	watts	0= -3000, 2047= 0, 4095= +3000	1
9C48 - 9C48	40009 - 40009	VARs, 3-Ph total	UINT16	0 to 4095	VARs	watts, VARs, VAs =	1
9C49 - 9C49	40010 - 40010	VAs, 3-Ph total	UINT16	2047 to 4095	VAs	3000 * (register - 2047) / 2047	1
9C4A - 9C4A	40011 - 40011	Power Factor, 3-Ph total	UINT16	1047 to 3047	none	1047= -1, 2047= 0, 3047= +1 pf = (register - 2047) / 1000	1
9C4B - 9C4B	40012 - 40012	Frequency	UINT16	0 to 2730	Hz	0= 45 or less, 2047= 60, 2730= 65 or more freq = 45 + ((register / 4095) * 30)	1

9C4C - 9C4C	40013 - 40013	Volts A-B	UINT16	2047 to 4095	volts	2047= 0, 4095= +300	1
9C4D - 9C4D	40014 - 40014	Volts B-C	UINT16	2047 to 4095	volts	volts = 300 * (register - 2047) / 2047	1
9C4E - 9C4E	40015 - 40015	Volts C-A	UINT16	2047 to 4095	volts		1
9C4F - 9C4F	40016 - 40016	CT numerator	UINT16	1 to 9999	none	CT = numerator * multiplier / denominator	1
9C50 - 9C50	40017 - 40017	CT multiplier	UINT16	1, 10, 100	none		1
9C51 - 9C51	40018 - 40018	CT denominator	UINT16	1 or 5	none		1
9C52 - 9C52	40019 - 40019	PT numerator	UINT16	1 to 9999	none	PT = numerator * multiplier / denominator	1
9C53 - 9C53	40020 - 40020	PT multiplier	UINT16	1, 10, 100	none		1
9C54 - 9C54	40021 - 40021	PT denominator	UINT16	1 to 9999	none		1
9C55 - 9C56	40022 - 40023	W-hours, Positive	UINT32	0 to 99999999	Wh per energy format	* 5 to 8 digits	2
9C57 - 9C58	40024 - 40025	W-hours, Negative	UINT32	0 to 99999999	Wh per energy format	* decimal point implied, per energy format	2
9C59 - 9C5A	40026 - 40027	VAR-hours, Positive	UINT32	0 to 99999999	VARh per energy format	* resolution of digit before decimal point = units, kilo, or mega, per energy format	2
9C5B - 9C5C	40028 - 40029	VAR-hours, Negative	UINT32	0 to 99999999	VARh per energy format		2
9C5D - 9C5E	40030 - 40031	VA-hours	UINT32	0 to 99999999	VAh per energy format		2
9C5F - 9C60	40032 - 40033	W-hours, Positive, Phase A	UINT32	0 to 99999999	Wh per energy format	* see note 10	2
9C61 - 9C62	40034 - 40035	W-hours, Positive, Phase B	UINT32	0 to 99999999	Wh per energy format		2
9C63 - 9C64	40036 - 40037	W-hours, Positive, Phase C	UINT32	0 to 99999999	Wh per energy format		2
9C65 - 9C66	40038 - 40039	W-hours, Negative, Phase A	UINT32	0 to 99999999	Wh per energy format		2
9C67 - 9C68	40040 - 40041	W-hours, Negative, Phase B	UINT32	0 to 99999999	Wh per energy format		2
9C69 - 9C6A	40042 - 40043	W-hours, Negative, Phase C	UINT32	0 to 99999999	Wh per energy format		2
9C6B - 9C6C	40044 - 40045	VAR-hours, Positive, Phase A	UINT32	0 to 99999999	VARh per energy format		2
9C6D - 9C6E	40046 - 40047	VAR-hours, Positive, Phase B	UINT32	0 to 99999999	VARh per energy format		2
9C6F - 9C70	40048 - 40049	VAR-hours, Positive, Phase C	UINT32	0 to 99999999	VARh per energy format		2
9C71 - 9C72	40050 - 40051	VAR-hours, Negative, Phase A	UINT32	0 to 99999999	VARh per energy format		2
9C73 - 9C74	40052 - 40053	VAR-hours, Negative, Phase B	UINT32	0 to 99999999	VARh per energy format		2
9C75 - 9C76	40054 - 40055	VAR-hours, Negative, Phase C	UINT32	0 to 99999999	VARh per energy format		2
9C77 - 9C78	40056 - 40057	VA-hours, Phase A	UINT32	0 to 99999999	VAh per energy format		2
9C79 - 9C7A	40058 - 40059	VA-hours, Phase B	UINT32	0 to 99999999	VAh per energy format		2
9C7B - 9C7C	40060 - 40061	VA-hours, Phase C	UINT32	0 to 99999999	VAh per energy format		2
9C7D - 9C7D	40062 - 40062	Watts, Phase A	UINT16	0 to 4095	watts	0= -3000, 2047= 0, 4095= +3000 watts, VARs, VAs = 3000 * (register - 2047) / 2047	1
9C7E - 9C7E	40063 - 40063	Watts, Phase B	UINT16	0 to 4095	watts		1
9C7F - 9C7F	40064 - 40064	Watts, Phase C	UINT16	0 to 4095	watts		1
9C80 - 9C80	40065 - 40065	VARs, Phase A	UINT16	0 to 4095	VARs		1
9C81 - 9C81	40066 - 40066	VARs, Phase B	UINT16	0 to 4095	VARs		1
9C82 - 9C82	40067 - 40067	VARs, Phase C	UINT16	0 to 4095	VARs		1
9C83 - 9C83	40068 - 40068	VAs, Phase A	UINT16	2047 to 4095	VAs		1
9C84 - 9C84	40069 - 40069	VAs, Phase B	UINT16	2047 to 4095	VAs		1
9C85 - 9C85	40070 - 40070	VAs, Phase C	UINT16	2047 to 4095	VAs		1
9C86 - 9C86	40071 - 40071	Power Factor, Phase A	UINT16	1047 to 3047	none	1047= -1, 2047= 0, 3047= +1 pf = (register - 2047) / 1000	1
9C87 - 9C87	40072 - 40072	Power Factor, Phase B	UINT16	1047 to 3047	none		1
9C88 - 9C88	40073 - 40073	Power Factor, Phase C	UINT16	1047 to 3047	none		1
9C89 - 9CA2	40074 - 40099	Reserved	N/A	N/A	none		26
9CA3 - 9CA3	40100 - 40100	Reset Energy Accumulators	UINT16	password5		Write-only register; always reads as 0.	1
						Block Size:	100

Reserved Section							
Reserved Block							
C34C - C3CD	49997 - 50126	Reserved				Set to 0.	130
						Block Size:	130
Reserved Block							
C737 - C7B6	51000 - 51127	Reserved				Set to 0.	128
						Block Size:	128
End of Map							
Data Formats							
ASCII	ASCII characters packed 2 per register in high, low order and without any termination characters. For example, "IQ250" would be 3 registers containing 0x4951, 0x2002, 0x0500.						
SINT16 / UINT16	16-bit signed / unsigned integer.						
SINT32 / UINT32	32-bit signed / unsigned integer spanning 2 registers. The lower-addressed register is the high order half.						
FLOAT	32-bit IEEE floating point number spanning 2 registers. The lower-addressed register is the high order half (i.e., contains the exponent).						
TSTAMP	3 adjacent registers, 2 bytes each. First (lowest-addressed) register high byte is year (0-99), low byte is month (1-12). Middle register high byte is day(1-31), low byte is hour (0-23 plus DST bit). DST						
Notes							
1	All registers not explicitly listed in the table read as 0. Writes to these registers will be accepted but won't actually change the register (since it doesn't exist).						
2	Meter Data Section items read as 0 until first readings are available or if the meter is not in operating mode. Writes to these registers will be accepted but won't actually change the register.						
3	Register valid only in programmable settings update mode. In other modes these registers read as 0 and return an illegal data address exception if a write is attempted.						
4	Meter command registers always read as 0. They may be written only when the meter is in a suitable mode. The registers return an illegal data address exception if a write is attempted in an incorrect mode.						
5	If the password is incorrect, a valid response is returned but the command is not executed. Use 5555 for the password if passwords are disabled in the programmable settings.						
6	M denotes a 1,000,000 multiplier.						
7	Each identifier is a Modbus register. For entities that occupy multiple registers (FLOAT, SINT32, etc.) all registers making up the entity must be listed, in ascending order. For example, to log phase A volts, VAs, voltage THD, and VA hours, the register list would be 0x3E7, 0x3E8, 0x411, 0x412, 0x176F, 0x61D, 0x61E and the number of registers (0x7917 high byte) would be 7.						
8	Writing this register causes data to be saved permanently in nonvolatile memory. Reply to the command indicates that it was accepted but not whether or not the save was successful. This can only be determined after the meter has restarted.						
9	Reset commands make no sense if the meter state is LIMP. An illegal function exception will be returned.						
10	Energy registers should be reset after a format change.						
11	Entities to be monitored against limits are identified by Modbus address. Entities occupying multiple Modbus registers, such as floating point values, are identified by the lower register address. If any of the 8 limits is unused, set its identifier to zero. If the indicated Modbus register is not used or is a nonsensical entity for limits, it will behave as an unused limit.						

- 12 There are 2 setpoints per limit, one above and one below the expected range of values. LM1 is the "too high" limit, LM2 is "too low". The entity goes "out of limit" on LM1 when its value is greater than the setpoint. It remains "out of limit" until the value drops below the in threshold. LM2 works similarly, in the opposite direction. If limits in only one direction are of interest, set the in threshold on the "wrong" side of the setpoint. Limits are specified as % of full scale, where full scale is automatically set appropriately for the entity being monitored:
- current FS = CT numerator * CT multiplier
 - voltage FS = PT numerator * PT multiplier
 - 3 phase FS = CT numerator * CT multiplier * PT numerator
 - power * PT multiplier * 3 [* SQRT(3) for delta hookup]

 - single FS = CT numerator * CT multiplier * PT numerator
 - phase * PT multiplier [* SQRT(3) for delta hookup]
 - power
 - frequenc FS = 60 (or 50)
 - y
 - power FS = 1.0
 - factor
 - percenta FS = 100.0
 - ge
 - angle FS = 180.0
- 13 THD not available shows 10000 in all THD and harmonic magnitude and phase registers for the channel. THD may be unavailable due to low V or I amplitude, delta hookup (V only), or IQ Model.
- 14 Option Card Identification and Configuration Block is an image of the EEPROM on the card.
- 15 A block of data and control registers is allocated for each option slot. Interpretation of the register data depends on what card is in the slot.
- 16 Measurement states: Off occurs during programmable settings updates; Run is the normal measuring state; Limp indicates that an essential non-volatile memory block is corrupted; and Warmup occurs briefly (approximately 4 seconds) at startup while the readings stabilize. Run state is required for measurement, historical logging, demand interval processing, limit alarm evaluation, min/max comparisons, and THD calculations. Resetting min/max or energy is allowed only in run and off states; warmup will return a busy exception. In limp state, the meter reboots at 5 minute intervals in an effort to clear the problem.
- 17 Limits evaluation for all entites except demand averages commences immediately after the warmup period. Evaluation for demand averages, maximum demands, and minimum demands commences at the end of the first demand interval after startup.
- 18 Only 1 input on all digital input cards may be specified as the end-of-interval pulse.
- 19 Combination of class and type currently defined are:
- 0x41 = Relay card
 - 0x42 = Pulse card
 - 0x81 = 0-1mA analog output card
 - 0x82 = 4-20mA analog output card.

App.C

Using DNP Mapping for IQ 250/260

Overview

This Appendix describes the functionality of the DNP Lite protocol in the IQ 250/260. A DNP programmer must follow this information in order to retrieve data from the IQ 250/260 meter using this protocol. DNP Lite is a reduced set of the Distributed Network Protocol Version 3.0 subset 2, and it gives enough functionality to get critical measurements from the IQ 250/260.

The DNP Lite supports class 0 object only. No event generation is supported. The IQ 250/260 when in DNP Lite will always act as a secondary device (slave).

Physical Layer

DNP Lite uses serial communication. It can be assigned to Port 2 (RS485 compliant port) or any communication capable option board. Speed and data format is transparent for DNP Lite: they can be set to any supported value. The IrDA port cannot use DNP Lite.

Data Link Layer

The IQ 250/260 can be assigned with a value from 1 to 65534 as the target device address for DNP Lite. The data link layer follows the standard frame FT3 used by the DNP Version 3.0 protocol, but only 3 functions are implemented: Reset Link, Reset User and Link Status, as depicted in following table.

Function	Function Code
Reset Link	0
Reset User	1
Link Status	9

Table C.1: Supported Link Functions. [dst] and [src] are the device address of IQ 250/260 and Master device, respectively.

In order to establish a clean communication with the IQ 250/260, we recommended you perform the **Reset Link** and **Reset User** functions. The **Link Status** is not mandatory but if queried it will be attended to.

The inter-character **time-out** for DNP Lite is **1 second**. If this amount of time, or more, elapses between two consecutive characters within a FT3 frame, the frame will be dropped.

Application Layer

In the IQ 250/260, DNP Lite supports the **Read** function, **Write** Function, the **Direct Operate** function and the **Direct Operate Unconfirmed** function.

- The **Read** function (**code 01**) provides a means for reading the critical measurement data from the IQ 250/260 meter. This function should be posted to read object 60 variation 1, which will read all the available Class 0 objects from the DNP Lite register map. See register map in Section C.6. In order to retrieve all objects with their respective variations, the qualifier must be set to ALL (0x06). See Section C.7 for an example showing a read Class 0 request data from the IQ 250/260.
- The **Write** function (**code 02**) provides a mean for clearing the Device restart bit in the Internal Indicator register only. This is mapped to Object 80, point 0 with variation 1. When clearing the restart device indicator use qualifier 0. Section C.7 shows the supported frames for this function.
- The **Direct Operate** function (**code 05**) is intended for resetting the energy counters and the demand counters (minimum and maximum energy registers). These actions are mapped to Object 12, point 0 and point 2, that are seen as a control relay. The relay must be operated (On) in 0 msec and released (Off) in 1 msec only. Qualifiers 0x17 or x28 are supported for writing the energy reset. Sample frames are shown in Section C.7.
- The **Direct Operate Unconfirmed** (or **Unacknowledged**) function (**code 06**) is intended for asking the communication port to switch to Modbus RTU protocol from DNP Lite. This switching is seen as a control relay mapped into Object 12, point 1 in the IQ 250/260. The relay must be operated with qualifier 0x17, code 3 count 0, with 0 millisecond on and 1 millisecond off, only. After sending this request the current communication port will accept Modbus RTU frames only. To make this port go back to DNP protocol, the unit must be power-recycled. Section C.7 shows the constructed frame to perform DNP to Modbus RTU protocol change.

Error Reply

In the case of an unsupported function, or any other recognizable error, an error reply will be generated from the IQ 250/260 to the Primary station (the requester). The Internal Indicator field will report the type of error: unsupported function or bad parameter.

The broadcast acknowledge and restart bit, are also signaled in the internal indicator but they do not indicate an error condition.

DNP Lite Register Map

Object 10 – Binary Output States

Object	Point	Var	Description	Format	Range	Multiplier	Units	Comments
10	0	2	Reset Energy Counters	BYTE	Always 1	N/A	None	Read by Class 0 Only
10	1	2	Change to Modbus RTU Protocol	BYTE	Always 1	N/A	None	Read by Class 0 Only
10	2	2	Reset Demand Cntrs (Max / Min)	BYTE	Always 1	N/A	None	Read by Class 0 Only

Object 12 – Control Relay Outputs

Object	Point	Var	Description	Format	Range	Multiplier	Units	Comments
12	0	1	Reset Energy Counters	N/A	N/A	N/A	none	Responds to Function 5 (Direct Operate), Qualifier Code 17x or 28x, Control Code 3, Count 0, On 0 msec, Off 1 msec ONLY.
12	1	1	Change to Modbus RTU Protocol	N/A	N/A	N/A	none	Responds to Function 6 (Direct Operate - No Ack), Qualifier Code 17x, Control Code 3, Count 0, On 0 msec, Off 1 msec ONLY.
12	2	1	Reset Demand Counters (Max / Min)	N/A	N/A	N/A	none	Responds to Function 5 (Direct Operate), Qualifier Code 17x or 28x, Control Code 3, Count 0, On 0 msec, Off 1 msec ONLY.

Object 20 – Binary Counters (Primary Readings) - Read via Class 0 only

Object	Point	Var	Description	Format	Range	Multiplier	Units	Comments
20	0	5	W-hours, Positive	UINT32	0 to 99999999	Multiplier = 10(n-d), where n and d are derived from the energy format. n = 0, 3, or 6 per energy format scale and d = number of decimal places.	W hr	example: energy format = 7.2K and W-hours counter = 1234567 n=3 (K scale), d=2 (2 digits after decimal point), multiplier = 10(3-2) = 101 = 10, so energy is 1234567 * 10 Whrs, or 12345.67 KWhrs
20	1	5	W-hours, Negative	UINT32	0 to 99999999		W hr	
20	2	5	VAR-hours, Positive	UINT32	0 to 99999999		VAR hr	
20	3	5	VAR-hours, Negative	UINT32	0 to 99999999		VAR hr	
20	4	5	VA-hours, Total	UINT32	0 to 99999999		VA hr	

Object 30 – Analog Inputs (Secondary Readings) - Read via Class 0 only

Object	Point	Var	Description	Format	Range	Multiplier	Units	Comments
30	0	4	Meter Health	sint16	0 or 1	N/A	None	0 = OK
30	1	4	Volts A-N	sint16	0 to 32767	(150 / 32768)	V	Values above 150V secondary read 32767.
30	2	4	Volts B-N	sint16	0 to 32767	(150 / 32768)	V	
30	3	4	Volts C-N	sint16	0 to 32767	(150 / 32768)	V	
30	4	4	Volts A-B	sint16	0 to 32767	(300 / 32768)	V	Values above 300V secondary read 32767.
30	5	4	Volts B-C	sint16	0 to 32767	(300 / 32768)	V	
30	6	4	Volts C-A	sint16	0 to 32767	(300 / 32768)	V	
30	7	4	Amps A	sint16	0 to 32767	(10 / 32768)	A	Values above 10A secondary read 32767.
30	8	4	Amps B	sint16	0 to 32767	(10 / 32768)	A	
30	9	4	Amps C	sint16	0 to 32767	(10 / 32768)	A	
30	10	4	Watts, 3-Ph total	sint16	-32768 to +32767	(4500 / 32768)	W	
30	11	4	VARs, 3-Ph total	sint16	-32768 to +32767	(4500 / 32768)	VAR	
30	12	4	VAs, 3-Ph total	sint16	0 to +32767	(4500 / 32768)	VA	
30	13	4	Power Factor, 3-Ph total	sint16	-1000 to +1000	0.001	None	
30	14	4	Frequency	sint16	0 to 9999	0.01	Hz	
30	15	4	Positive Watts, 3-Ph, Maximum Avg Demand	sint16	-32768 to +32767	(4500 / 32768)	W	
30	16	4	Positive VARs, 3-Ph, Maximum Avg Demand	sint16	-32768 to +32767	(4500 / 32768)	VAR	
30	17	4	Negative Watts, 3-Ph, Maximum Avg Demand	sint16	-32768 to +32767	(4500 / 32768)	W	
30	18	4	Negative VARs, 3-Ph, Maximum Avg Demand	sint16	-32768 to +32767	(4500 / 32768)	VAR	
30	19	4	VAs, 3-Ph, Maximum Avg Demand	sint16	-32768 to +32767	(4500 / 32768)	VA	
30	20	4	Angle, Phase A Current	sint16	-1800 to +1800	0.1	degree	
30	21	4	Angle, Phase B Current	sint16	-1800 to +1800	0.1	degree	
30	22	4	Angle, Phase C Current	sint16	-1800 to +1800	0.1	degree	
30	23	4	Angle, Volts A-B	sint16	-1800 to +1800	0.1	degree	
30	24	4	Angle, Volts B-C	sint16	-1800 to +1800	0.1	degree	
30	25	4	Angle, Volts C-A	sint16	-1800 to +1800	0.1	degree	
30	26	4	CT numerator	sint16	1 to 9999	N/A	none	CT ratio =
30	27	4	CT multiplier	sint16	1, 10, or 100	N/A	none	(numerator * multiplier) / denominator
30	28	4	CT denominator	sint16	1 or 5	N/A	none	
30	29	4	PT numerator	SINT16	1 to 9999	N/A	none	PT ratio =
30	30	4	PT multiplier	SINT16	1, 10, or 100	N/A	none	(numerator * multiplier) / denominator
30	31	4	PT denominator	SINT16	1 to 9999	N/A	none	
30	32	4	Neutral Current	SINT16	0 to 32767	(10 / 32768)	A	For 1A model, multiplier is (2 / 32768) and values above 2A secondary read 32767

Object 80 – Internal Indicator

Object	Point	Var	Description	Format	Range	Multiplier	Units	Comments
80	0	1	Device Restart Bit	N/A	N/A	N/A	none	Clear via Function 2 (Write), Qualifier Code 0.

DNP Message Layouts

Legend

All numbers are in hexadecimal base. In addition the following symbols are used.

dst	16 bit frame destination address
src	16 bit frame source address
crc	DNP Cyclic redundant checksum (polynomial $x^{16}+x^{13}+x^{12}+x^{11}+x^{10}+x^7+x^6+x^5+x^2+1$)
x	transport layer data sequence number
y	application layer data sequence number

Link Layer related frames

Reset Link

Request	05	64	05	C0	dst	src	crc
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Reply	05	64	05	00	src	dst	crc
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Reset User

Request	05	64	05	C1	dst	src	crc
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Reply	05	64	05	00	src	dst	crc
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Link Status

Request	05	64	05	C9	dst	src	crc
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Reply	05	64	05	0B	src	dst	crc
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Application Layer related frames

Clear Restart

Request	05	64	0E	C4	dst		src		crc	
	Cx	Cy	02	50	01	00	07	07	00	crc

Reply	05	64	0A	44	src	dst	crc
	Cx	Cy	81	int. ind.		crc	

Class 0 Data

Request	05	64	0B	C4	dst	src	crc
	Cx	Cy	01	3C	01	06	crc

Request	05	64	14	C4	dst		src		crc							
(alternate)	Cx	Cy	01	3C	02	06	3C	03	06	3C	04	06	3C	01	06	crc

Reply	05	64	72	44	src	dst		crc											
(same for either request)	Cx	Cy	81	int. ind.		14	05	00	00	04	pt 0				pt 1		crc		
	pt 1		pt 2			pt 3				pt 4				1E	04	crc			
	00	00	20	pt 0		pt 1		pt 2		pt 3		pt 4		pt 5		pt6	crc		
	pt6	pt 7		pt 8		pt 9		pt 10		pt 11		pt 12		pt 13			crc		
		pt 15		pt 16		pt 17		pt 18		pt 19		pt 20		pt 21			crc		
		pt 23		pt 24		pt 25		pt 26		pt 27		pt 28		pt 29			crc		
		pt 31		pt 32		0A	02	00	00	02	pt0	pt1	pt2	crc					

Reset Energy

Request	05	64	18	C4	dst	src	crc										
	Cx	Cy	05	0C	01	17	01	00	03	00	00	00	00	00	01	00	crc
	00	00	00	crc													

Reply	05	64	1A	44	src	dst	crc										
	Cx	Cy	81	int. ind.	0C	01	17	01	00	03	00	00	00	00	00	00	crc
	01	00	00	00	00	crc											

Request	05	64	1A	C4	dst	src	crc										
(alternate)	Cx	Cy	05	0C	01	28	01	00	00	00	03	00	00	00	00	00	crc
	01	00	00	00	00	crc											

Reply	05	64	1C	44	src	dst	crc										
	Cx	Cy	81	int. ind.	0C	01	28	01	00	00	00	03	00	00	00	00	crc
	00	00	01	00	00	00	00	crc									

Switch to Modbus

Request	05	64	18	C4	dst	src	crc										
	Cx	Cy	06	0C	01	17	01	01	03	00	00	00	00	00	01	00	crc
	00	00	00	crc													

No Reply**Reset Demand (Maximums & Minimums)**

Request	05	64	18	C4	dst	src	crc										
	Cx	Cy	05	0C	01	17	01	02	03	00	00	00	00	00	01	00	crc
	00	00	00	crc													

Reply	05	64	1A	44	src	dst	crc										
	Cx	Cy	81	int. ind.	0C	01	17	01	02	03	00	00	00	00	00	00	crc
	01	00	00	00	00	crc											

Request	05	64	1A	C4	dst		src		crc								
(alternate)	Cx	Cy	05	0C	01	28	01	02	00	00	03	00	00	00	00	00	crc
	01	00	00	00	00	crc											

Reply	05	64	1C	44	src		dst		crc								
	Cx	Cy	81	int. ind.	0C	01	28	01	02	00	00	03	00	00	00	crc	
	00	00	01	00	00	00	00	crc									

Error Reply

Reply	05	64	0A	44	src		dst		crc	
	Cx	Cy	81	int. ind.		crc				